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AUTOMOTIVE INDUSTRIES
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VOL. 51 NEW YORK—THURSDAY, NOVEMBER 27, 1924 NO. 22

Traffic Accidents Can Be Made Impossible

"Stop! Look! and Listen!" is a good motto, but accidents at grade crossings were stopped by elimination of such places. Three paths may lead toward highway safety.

By Norman G. Shidle

THERE is one sure way to prevent traffic accidents; make it impossible for them to happen. The slogan "Stop! Look! and Listen!" has had more publicity and more emphasis than any other single phrase in the last twenty years. The railroads did a big educational job in trying to get it across. But when they got all through they found just one real method of stopping grade crossing accidents. They began to eliminate the grade crossings.

Three general paths may be taken toward solution of the traffic safety problem:

1. Education.
2. Legislation.
3. Elimination of physical hazards.

All three methods have been tried more or less and all three will be used advantageously in the future. Each one has its limitations as well as its possibilities, however. These should be recognized.

Traffic safety has become a living dynamic issue "crying for something to be done."

And something is being done—a good many somethings, as a matter of fact, in many parts of the country. A movement is well on its way, moreover, to coordinate all these somethings so that they can be welded into a useful whole. The automobile industry, through the N. A. C. C. traffic safety committee, is playing a big part in this work.

But those men and committees devoting time and energy to traffic safety work, cannot hope to achieve their purpose without a conscious, aroused group of automotive men behind them; without every man in the industry feeling a certain sense of personal responsibility for the troubles as well as the achievements of the vehicle which he has helped to create.

Theoretically, education will cure all the ills of the world. Practically it can be little more than an able assistant, so far as the next generation or so are concerned. Education is a steady but an extremely slow process. It involves an attempt to raise the general thinking ability of the race and is carried on by operating with millions of individual minds.

IT is true that remarkable results often can be achieved through impressing a single idea on the minds of many people. Wars can be fought, Presidents elected or defeated, millions of items sold where thousands once were disposed of, and traffic accidents can be cut down. But education is not the final answer. Its chief value is that it can be applied immediately. Streets need not be torn up nor new traffic regulations promulgated before education work begins to have an effect in cutting down the toll of human suffering.

Legislation, as a means of bettering the traffic situation, probably has been more abused than any other single method. The American people as a whole seem to have a naive and sublime trust in the power of a law to settle any question and to provide any given condition desired.

A lot of folks exist in every community who can't sleep nights until they get a law passed forbidding or compelling this or that. Once they get their pet regulation on the statute books, most of them stop worry-

ing. The law is passed and—in their minds—the problem is solved. Too often, of course, the passage of the law doesn't mean anything.

This tendency to overregulate naturally has carried over into the traffic accident situation. Examination of drivers has been one of the chief measures advocated as a means of eliminating those unfit to drive.

The idea would be good if there seemed to be the slightest chance of such examinations accomplishing their purpose.

BUT aren't the chances pretty slight? Before too much reliance is placed on such tests a few pertinent questions should be answered frankly:

How much would it cost to give a driver's examination that really would determine the ability of the individual to operate his car under those conditions in which accidents are most likely to occur?

What percentage of accidents actually are due to inexperience of drivers?

What assurance can an examination give that the driver who is competent, physically and mentally, at the moment of the test will be equally competent 24 hours from that time?

Isn't it moral rather than physical responsibility that is needed to prevent accidents?

Is there any examination which can determine moral responsibility?

Drivers' examinations, if utilized, should be recognized clearly for what they are worth. They will eliminate as motor vehicle operators, people who are physically incompetent to drive a car and those who are altogether lacking in skill. They don't do much more and aren't likely to in the future unless the sums expended on them be all out of proportion to the value to be derived. Even if enormous sums were spent there is some doubt as to how far the effectiveness of such tests could be increased.

Motor vehicle legislation, of course, is essential and beneficial in many cases. The only danger arises in those cases where legislation precedes a study of the specific problem and a development of principles upon which wise and useful regulations may be based.

THE third way to prevent traffic accidents is through the design of roadways and sidewalks which will permit safer movement of traffic regardless of the responsibility of the vehicle operators. Along this line seems to lie the greatest possibilities for permanent improvement in the traffic accident situation.

No matter how careful and watchful pedestrians and motorists may be, it can hardly be expected that accidents will be reduced to a minimum under the physical conditions which prevail in New York City and in many other metropolitan centers throughout the country. In many cases the pedestrian must possess physical agility as well as constant mental watchfulness if he is to progress through the streets with safety at any reasonable rate.

Everybody can't be physically agile and no amount of educational work will make the majority of people mentally alert for any considerable part of the time.

Talking on this subject recently, C. F. Kettering, recognized as one of the keenest students of human nature in the industry, went so far as to say that any system of traffic regulation based on the idea that most people can be expected to exhibit human intelligence is bound to fail. There are sound psychological grounds for believing Mr. Kettering to be right.

The best way to prevent accidents is to make it impossible for them to happen. Educational work to prevent grade crossing accidents has been going on for many years, but still such accidents continue to occur with distressing regularity. The only 100 per cent means yet found to stop them is by eliminating the grade crossing.

So with many other forms of traffic dangers. Probably the only way to dispose of them will be to construct streets or highways so that a particular kind of accident can't happen.

At many points in city traffic, for instance, it is impossible for the pedestrian to cross, even at street intersections, with perfect safety. Sometimes the congestion is so great at these points that jay-walking seems almost desirable from a safety standpoint.

Certainly there would be less jay-walking if crossing at street intersections were made more attractive.

THIS fact is recognized in one or two of the recommendations made by the committee on traffic control in its report to be submitted to the National Conference on Street and Highway Safety.

This committee recommends "that in cities pedestrians should be required to keep within the boundaries of designated safety zones and crossing places and that motorists should be required to accord pedestrians safe and **dignified** use of such safety zones and crossing places."

"Certainly," the committee points out, "if motorists will display proper consideration for the pedestrian crossing at intersections with the traffic, thus demonstrating greater safety at these points, this will go far toward encouraging him to promote his own and the general safety."

But, after all, can a condition of this kind be more than ameliorated even by the utmost consideration for one another on the part of the pedestrian and the motorist? Mayor Hylan of New York said recently that "Many of those intimately in touch with the traffic problem in the Police Department are not at all hesitant in saying that the extent of regulation appears to have reached the limit. Other devices must be resorted to."

The troubles resulting from congested traffic are so great and so far reaching that cities will have to look forward to taking radical means to better conditions.

Separate traffic levels for motor vehicles and pedestrians seems to be an almost inevitable necessisty in our larger urban centers and many growing cities may save considerable money and trouble by preparing at once for the time when they will be faced with a similar neces sity.

MANY large cities today are paying dearly for lack of foresight on the part of those who lived a generation ago. City-plan changes, now made necessary by conditions not sufficiently realized years ago, are costly and slow.

So it appears that solution of the traffic accident problem lies in the hands of the educators, the legislators, and the city planners, architects and engineers—and of these three, the last group seems to be the one to which we must look for ultimate solution of the worst of the present difficulties.

Engine Is Offset in One of Three New Models of the Yellow Coach Co.

Placing power and transmission units to one side brings axle housing under seat and avoids aisle ramp. Air brakes of own design fitted on all four wheels.

YELLOW Coach Manufacturing Company of Chicago now is producing three bus chassis for various types of service. These are termed X. Y. and Z. Two of these, X and Y, are entirely new, while model Z has undergone numerous changes since it was described in our issue of Aug. 16, 1923.

Model Y is designed for high speed interurban passenger service and is powered with a six-cylinder sleeve valve engine capable of developing over 100 hp. This engine was described in AUTOMOTIVE INDUSTRIES of Oct. 2, 1924. A notable feature of the Y chassis is the offset engine and propeller shaft. The engine is located 7½ in. to the left of the center, while the differential housing center is still farther to the left, since the propeller shaft is not quite parallel to the center line of the vehicle.

This construction makes possible a very low chassis without the disadvantage of excessive floor ramp over the rear axle. The differential housing clearance is under one of the seats at the left side of the body. Offsetting the propeller shaft and gearset also makes possible the use of a center longitudinal beam to support the floor at the center of its width. This reduces floor vibration and makes possible a very light floor construction. The chassis is balanced by mounting the battery, spare wheel and gas tank to the right of the center line. The battery is placed beside the engine, where it is easily accessible when the hood is lifted.

A longitudinal tube supports the right side of the engine. This tube serves also as an exhaust pipe which discharges into a tubular cross member which also acts as a muffler. These and other tubular frame members give the frame unusual torsional strength and help to relieve the body from torsional stresses.

While the mechanically operated brakes are considered as standard equipment, optional equipment of air brakes is provided. The four-wheel brake system used on the Y chassis is the result of twelve months' research work on the part of the Yellow Coach Mfg. Company's engineering department.

No brake adjustment ever is required due to the fact that the travel of the piston in the air-operated cylinders is sufficient to compensate completely for the wear of the lining. The air cylinders are placed between brake shoes and the pistons move outward to expand the brake shoes against the drum. The brake mechanism on each of the four wheels is identical so that all corresponding parts are interchangeable. The air compressor is designed as an integral part of the engine, is water cooled and is mounted at the front and driven from an eccentric on the end of the crankshaft. This arrangement eliminates gearing and avoids difficulties as regards lubrication.

In case of fracture of any of the air pipes automatic cutout valves shut off the broken line so that brakes on other wheels will operate. In case the connection to one of the front wheels develops a leak both front wheel brakes are cut off so as not to interfere with the steering. The two rear wheels then function to bring the vehicle to a stop. In addition to the foot-operated air-brakes the manually operated gearset brake is used for emergency service. Valves, strainer and operating plunger all can be disassembled without disturbing any of the pipe connections.

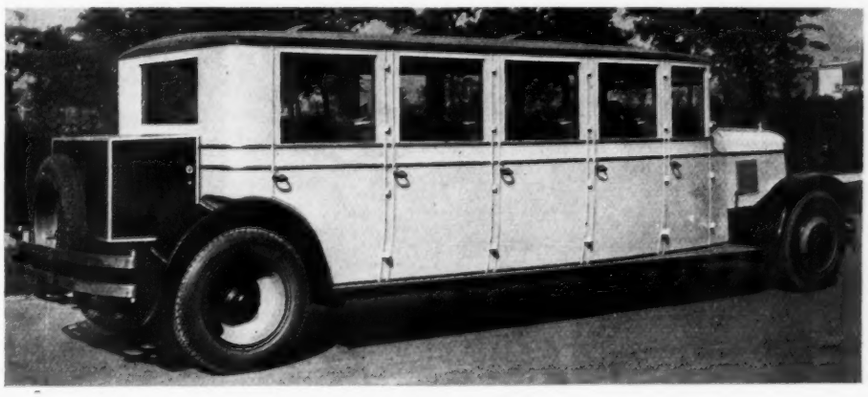
Compressed Air Drawn Through Cleaner

To insure the whole system being free from dirt and water all air from the pump is taken from the carbureter air cleaner and later through a second strainer or water trap. The air tank and supply pipes are placed close to the exhaust pipe to prevent the possibility of freezing up in cold weather.

A feature of this system is the control valve operated by the right foot. The driver instinctively applies pressure in proportion to the need for stopping the car quickly or slowly. Air pressure admitted to the brake cylinders is in proportion to the pressure exerted by the driver. Conversely, as the driver releases his foot from the brake pedal the air pressure in the brake cylinders is reduced correspondingly. With the four-wheel air brakes a total brake lining area of 689 sq. in. is obtained.

Steering is by a cam and lever type gear and 18-in. hand wheel. The clutch is the multiple disk type with 13 driving and 14 driven disks. A clutch brake is employed. The four-speed gearset has the following ratios: 6.3 to 1 in reverse, 5.35 to 1 in first speed, 2.84 to 1 in second, 1.76 to 1 in third and fourth direct.

Springs are of the progressive type in which, as the load increases additional leaves are brought into action. Front springs are 44 in. long and 3½ in. wide, while

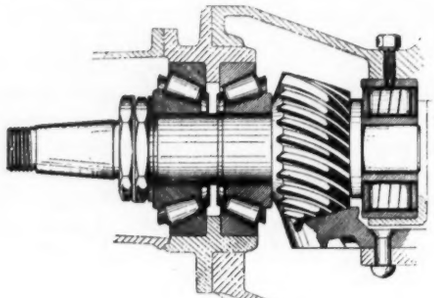


Model X Yellow Coach with sedan body seating 17 passengers

rear springs measure 60 in. long and 3½ in. wide.

With the high-torque, high-power sleeve valve engine employed, it is possible to use on this coach a spiral bevel type of drive in the rear axle. The rear axle pinion has 13 teeth and the bevel ring gear 50 teeth. These gears are made of case hardened chrome vanadium steel, having a scleroscope hardness of 90. Axle shafts are of chrome nickel steel and measures 2¾ in. in diameter at the outer end 2¼ in. at the splined differential end. The turning radius has been reduced by providing a steering lock of 43 deg. This gives a turning radius of 31 ft. 2 in.

The two-piece propeller shaft has a bearing in a central cross member of the frame. This bearing is designed to take any end thrust which it receives from the propeller shaft. It is thoroughly lubricated and additional lubricant can be supplied through a pipe running



Mounting of bevel pinion with outboard bearing in rear axle of model Y Yellow Coach chassis

to the outside of the frame where a lubrication nipple is installed.

Hood Has Door and Gutter

In order to obviate the necessity of lifting the hood when minor adjustments are needed, small doors are provided at both sides of the hood to allow easy access to the carbureter, oil filler, ignition leads and battery. A gutter is provided at the center hinge to prevent any water leaking through to the engine.

Adjustment of the gearset brake is readily accessible, as the mechanism projects partly through the floor near the driver's seat. When mechanically operated foot brakes are used instead of pneumatic brakes, double levers are employed on the rear axle itself, so that the increase in leverage is obtained at that point and the brake rods and cross shafts are not so heavily stressed. Adjustment of the service brake as well as the emergency brake is made by means of a turnbuckle accessible through a small door in the floor near driver's seat.

Ash and mahogany plywood are the materials used in the frame and interior panels respectively, of the parlor type body which seats 25 to 28 passengers. All wood joints are treated with lead or glue and either are screwed or bolted together. The interior is heated by carrying the exhaust through thin walled steel tubing which goes around the sides of the body. The gas enters the heating pipes after it has passed through the muffler.

How Model X Differs from Model Y

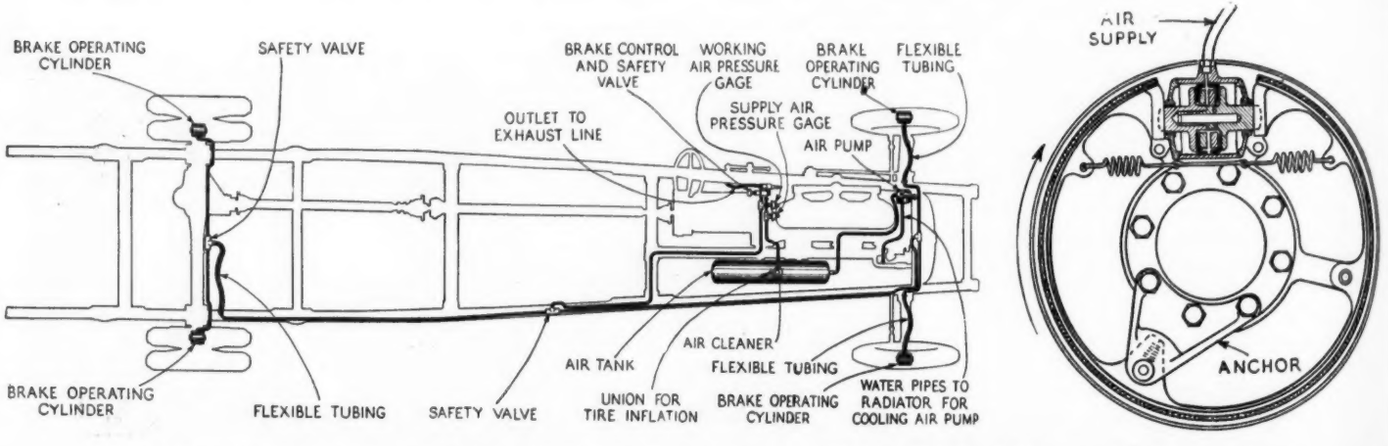
Model X coach is smaller than Model Y, although designed for similar service. It is not capable of the same maximum speed, however, and is designed primarily for shorter runs and for service where fewer passengers are carried. The sedan body seats 17 passengers while the front entrance type seats 21.

The engine in the X chassis is also a six-cylinder sleeve valve design but is smaller than the engine in the Model Y coach, the bore being 3½ in. and the stroke 4½ in. This engine develops a maximum of 55 b.hp. and uses 12-volt battery ignition. Service brakes are four-wheel Lockheed hydraulic internal expanding type, while the emergency brake operates on a gearset drum. A four-speed gearset and two-piece tubular propeller shaft are employed. The frame has heavy tubular cross members similar to those used on the Y chassis.

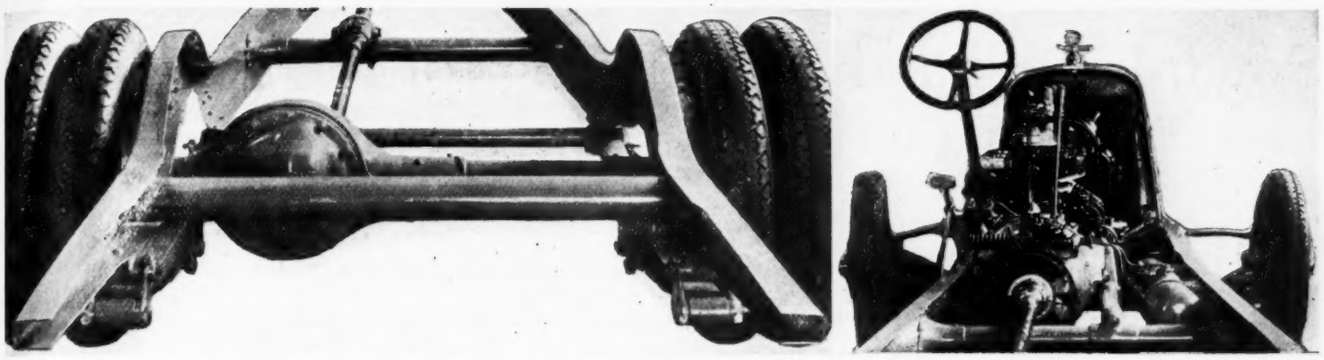
Force feed lubrication is used to the main engine and connecting rod bearings and the oil pump is attached to the crankcase upper half. The oil strainer is detachable from the outside of the crankcase. A hotspot manifold is used.

Two body types are available. Overall length in each case is 22 ft. 7 in. In the 21-passenger pay-enter coach the overall width is 88 in., overall height loaded 8 ft. 1⅞ in., headroom 6 ft. 2 in., floor height from ground loaded 21⅜ in. and step height from the ground 15 in. On the 17-passenger sedan coach the overall width is 84 in., the overall height loaded 6 ft. 7 in., the headroom inside body 57 in., floor height from the ground loaded 21⅜ in. and the height of step from ground 14 in. Heating is from the exhaust system, as in the case of Y coach. Ventilators are provided to remove the vitiated air.

Z type Yellow coach is designed primarily for city service, both single-deck and double-deck bodies being available. The single-deck coach seats 29 passengers with standing room for many more, while the double-deck coach provides seats for 67 passengers. The same chassis can be had either with a four-cylinder or six-cylinder sleeve valve engine. The six is the same one used in Model Y coach. When this is installed the radiator is moved forward to a position provided for it in the frame construction and the extra two cylinders take up the space thus provided.



Left—Air brake system on Model Y Yellow Coach chassis. Right—Detail of air-operated internal band



Rear and front ends of Model Y chassis showing offset powerplant and differential housing. Note tube supporting right side of engine. This tube serves also as an exhaust pipe. Air reservoir is mounted beside it

The position of the rear portion of the engine in relation to the chassis is unchanged. Total overall length of the chassis is 24 ft. 2¾ in., while the length of the 29-passenger single-deck body is 20 ft. 10 in. and the length of the 67-passenger double deck body is 28 ft. 2 in. The four-cylinder engine has a 4-in. bore and 6-in. stroke and develops 54 b.hp. Springs are of the progressive type. The front springs measure 48½ in. long and 3½ in. wide, while the rear springs are 60 in. long and 4 in. wide.

The rear axle is a semi-floating type having tapered roller bearings with shim adjustment. Rear axle ratios are furnished to suit operating conditions. Both foot and hand brakes operate on the rear wheels and are of the internal expanding type. Brake shoes are divided into four sections, operating in pairs, one pair in each wheel acting as a foot brake and the other pair as a hand brake.

The clutch has but one moving element, this being a single 1/16-in. hardened and ground saw steel disk, faced on both sides with friction material. A large number of coil springs provide even pressure over the surface of the disk. Brake adjusting devices are reached through a trap door in the floor of the driver's compartment.

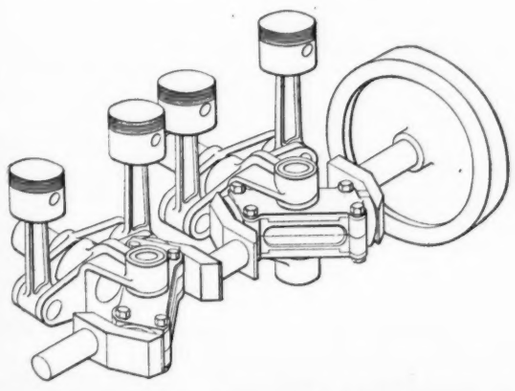
New Method of Balancing Four-Cylinder Engines

A NEW type of gasoline engine referred to as the Synchro-Balance engine, was exhibited at the Royal Agricultural Society's show in England last summer by Blackstone & Co., Ltd., of Stamford, Lincolnshire, and an illustrated description thereof appeared in a recent issue of *Engineering*. The novel features have to do mainly with the design of the crankshaft and the connections between the pistons and the crank, the objects being to eliminate unbalanced inertia forces and reduce the side thrust on the cylinder walls to a minimum.

The crankshaft has the usual three main bearings. There are no crankpins in the ordinary sense, the place of the two crankpins and one long crank arm between adjacent main bearings being taken by an inclined journal whose axis intersects the axis of the crankshaft at an angle of 37½ deg., the center of the journal always remaining in the axis of the crankshaft.

Each of these two journals carries a two-part bearing with trunnions on it, with which engages a yoke on a rocking shaft. This rocking shaft carries a "walking beam" to opposite ends of which the pistons of two adjacent cylinders are connected by connecting rods.

The method of operation of the mechanism probably can be understood best by considering motion to proceed from the crankshaft instead of from the other end. When the crankshaft turns, a rocking motion with an amplitude of 75 deg. is imparted to the rocking shaft, and this, of course, causes the pistons to reciprocate in the cylinders. It will at once be seen that if the connecting rods are vertical when the walking beam is horizontal the angularity of the connecting rods at the end of the stroke will be very small and thus the effect of angularity of connecting rods, which is the cause of unbalance in a four-cylinder conventional engine, is practically eliminated. Furthermore, the side thrust of the pistons on the cylinder wall is greatly reduced.



Moving parts of Blackstone Synchro-Balance engine

A ROHRBACH NO. 11 duralumin all metal flying-boat, fitted with two 375 hp. Rolls-Royce "Eagle" engines, has recently been rigged with a set of jury masts and sails, so that in the event of total engine failure and a landing has to be made on the open sea, the machine can proceed slowly to the shore, navigating with the wind available. While the tests conducted by the builders, the Rohrbach Metal Aeroplane Company, were of an experimental nature, it was proven that light masts and sails can provide an auxiliary method of maneuvre in the case of engine breakdown on ocean going aircraft.

Swedish Disk and Ball Bearings of High Carrying Capacity Introduced Here

Change in patent conditions makes possible sale of N. K. A. product, long well established in other countries. Novel type flexible spring steel wire cage said to facilitate lubrication.

BALL and roller bearings of Swedish manufacture, known as the N. K. A. and said to possess unusually high carrying capacity for a given size and to be well-adapted also for high speed, are being introduced to the American market by the Wollmar Engineering Corp., 224 East Forty-second Street, New York.

These bearings, long well established in other countries but not sold heretofore in the United States because of the Conrad patent, recently expired, are manufactured by the Nordiska Kullager Aktiebolaget of Gothenburg, Sweden. This concern makes radial and thrust ball bearings in all the common types and sizes, as well as a disk bearing with barrel type rollers.

It is understood that for the present the Wollmar Engineering Corp. will import all bearings sold in this market, but that an American factory will be built when a sufficient volume of trade is built up to justify the investment.

The N. K. A. ball bearing is of the type which is filled through a filling slot, so that the raceway can be filled practically completely with balls. This has the advantage that it adds to the carrying capacity of a bearing of given outside dimensions and ball diameter, which capacity is proportional to the number of balls. The disadvantages ordinarily associated with the filling slot are said to be overcome by so arranging the slot that it does not extend all the way to the center of the groove in the races. This would seem to be necessary in order to get the balls into

Fig. 1—N. K. A. ball bearing Note use of wire cage

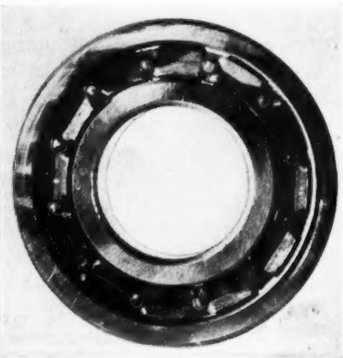


Fig. 2—N. K. A. disk bearing

the grooves, but by heating the outer ring before filling the bearing it is possible to get the balls in.

The bottom of the filling slot in the inner race is not parallel to the bearing axis, but tapers down toward the bottom of the race groove, whereby the weakening effect of the slot is reduced.

A special type of ball separator or cage is used. This consists of a coiled ring of spring steel wire, the ends of which are welded together electrically. Each convolution of the coil lies between a pair of adjacent balls and keeps them apart a small distance. Advantages claimed for this cage are that it is flexible and resistant to wear, that it permits the lubricant to get to all parts of the ball surfaces and that it permits inspection of the balls without taking the bearings apart. These bearings are made in single and double row radial and in the various thrust types. For line shafting a ball bearing with a spherical mounting is used to allow for flexure of the shafting.

A feature of the N. K. A. disk bearing is that the rollers or disks are self-guiding. These bearings comprise two races of the same form as that used with ball bearings, between which are inserted a series of disks of flattened barrel shape.

Self-Guiding Principle

To understand the self-guiding principle of these disks, consider them to be cut from an ellipsoid of rotation and placed between two flat surfaces, as shown in Fig. 3. As long as this ellipsoid rolls on the smallest great circle the contact surfaces will be symmetrical to the points A and B. If, on the contrary, the roller tends to turn say to the left, in a plane at right angles to the plane of the paper, and the bearing continues to rotate, thereby giving the roller a turn in the plane of the paper, the section of the ellipsoid will appear as the dashed line, and the points of contact will be moved to C and D. As these points are not opposite each other, a moment, which will turn the roller to the right in the plane of the paper, is created, thus returning it to its normal position.

It is stated, however, that this principle of static stability is not sufficient to insure uniform motion of the rollers. When the bearing is subjected to a radial load, one-half of the rollers are not under pressure, and hence their motion will not be influenced by the principle explained above.

Owing to the comparatively small width of the rollers, their moment of inertia about their normal axis of rotation is greater than that around any other axis through their center of gravity. Now, it is a well-known principle that a freely rotating body always tends to rotate around its axis of maximum inertia, hence the rollers are also dynamically self-guiding.

When the disk bearing is subjected to thrust load only, the resultant force on every roller is in a line making an angle of less than 90 deg. with the axis of rotation of the bearing. The rollers then take the position indicated in Fig. 4, which enables them to react against the thrust. When the bearing is subjected to both radial and thrust loads the rollers in different positions have different angles of reaction, depending upon the resultant force acting on them.

The above theoretical deductions have been verified by experiments with disk bearings without separators, and the N. K. A. firm publishes a diagram showing the almost complete agreement between the theoretical curve of angles of reaction and experimental results.

Owing to the shape of the rollers, they can be inserted between the races to the full number and then moved into

their correct positions by twisting them around. A separator or cage is used to keep the disks apart.

An advantage claimed for the disk bearing over ball bearings is that the former possess greater carrying capacity, which is due to the fact that with disks and balls of the same diameter the radius of transverse curvature of the disk surface is greater than the radius of the ball, and this adds to the carrying capacity. (See Fig. 5.) When the bearing is under full load practically the whole surface of the roller is in contact with the race, but near the edge of the roller the stress is quite low, so there is no danger of this portion of the roller being injured.

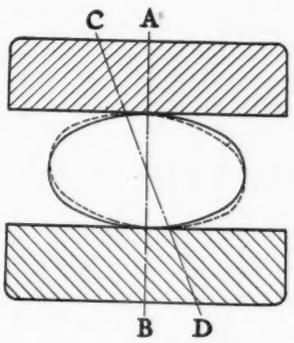


Fig. 3—Diagram showing ellipsoid of rotation displaced relative to plane of rolling

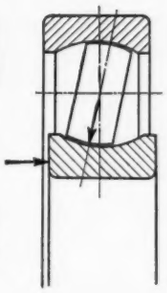


Fig. 4 — Position assumed by roller under axial load

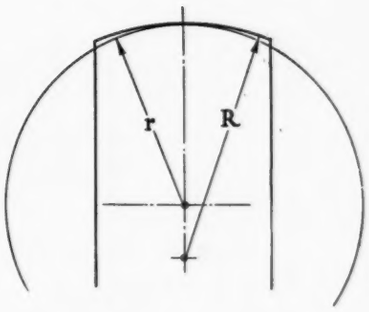


Fig. 5 — Diagram indicating the reason for the greater capacity of the disk bearing (which is proportional to rR) as compared with that of a ball bearing (proportional to r^2)

Causes of Red-Shortness in Iron

AN investigation was undertaken by the Bureau of Standards to throw light on some disputed matters as to the elements in iron which cause it to be brittle when worked on a forge or otherwise above a red heat. Sulphur is generally admitted to be a cause of this defect, but data as to the minimum percentage of this element necessary before red-shortness disappears are rather meager. Oxygen has been considered by many metallurgists to be as important in this regard as sulphur.

The opinions on the effect of copper are quite variable. Manganese is conceded generally to be a corrective for the red-shortness caused by sulphur and is thought by many to prevent or help prevent the red-shortness supposed to be caused by oxygen. Data as to the amounts of manganese to be used are given in the literature, but are in some cases contradictory.

Much of the discrepancy in views regarding effects of some of these elements is due to studies having been made on commercial steels in which it is difficult to insure that the element or elements studied are the only important ones present.

This investigation, therefore, was made with electrolytic iron or commercially pure iron as raw material. The melts were small (900g. approximately) and made under fairly good control in carbon helix vacuum furnaces or in a high-frequency induction furnace under air. The copper added was over 99.9 per cent pure and the manganese over 98 per cent. The carbon content of the samples in most cases did not exceed 0.60 per cent. The ingots were forged to ½-in. bars and then tested for red-shortness by bending back and forth over a blacksmith's anvil in a temperature range of 1100 to 500 deg. C. Samples classed as free from red-shortness were those which stood such a test without breaking.

The conclusions of this study are:

1. Sulphur is the principal element responsible for red-shortness. In order to prevent red-shortness in iron not more than 0.1 per cent sulphur should be present.

2. Oxygen in amounts up to 0.20 per cent does not cause red-shortness in pure iron if the sulphur is below 0.01 per cent.

3. Manganese may prevent red-shortness in iron when present to the extent of three times the sulphur percentage if the oxygen percentage is not above 0.04 per cent.

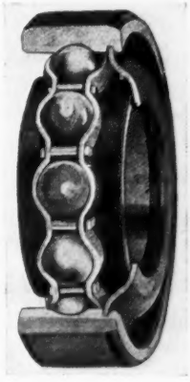
4. The presence of considerable amounts of oxygen in irons (0.10 per cent and above) tends to reduce the efficiency of manganese in preventing red-shortness. The hypothesis is advanced that this is because some of the manganese reported in such irons is present as oxide.

5. Copper (0.05 to 0.5 per cent) is of minor importance in its effect on red-shortness of pure iron, but in some of the specimens it tended to decrease the red-shortness.

A complete description of this investigation will be found in Technologic Paper, No. 261, copies of which may be obtained from the Superintendent of Documents at 10 cents a piece.

Pilot Bearing Retains Lubricant

A CLUTCH pilot bearing designed to retain lubricant is being marketed by Standard Steel and Bearings, Inc., of Plainville, Conn. This is a ball bearing of conventional design in most respects, but the outer race is grooved just outside the outer plans of the cage to receive



S. R. B. Clutch Pilot Bearing designed to retain lubricant

a steel retainer which is snapped into place. This retainer is formed, as shown in the accompanying cut, to fit close to the inner race and thus provide a compartment which will hold considerable lubricant and exclude foreign matter.

Since the rapid wear of clutch pilot bearing is attributed to lack of lubricant, the new bearing is said to solve the problem of lubrication, which long has been a source of annoyance and service complaints.

Service Data Should Help to Improve Design and Increase Sales

Speakers at joint N. A. C. C.-S. A. E. meeting show how to better service departments. Midgley explains ethyl gas deaths. Tabulation given of balloon tire sizes in use.

By W. L. Carver

DIVERSITY of topics and opinions characterized the Joint Service Meeting of the National Automobile Chamber of Commerce and the Society of Automotive Engineers, held at the Hotel Winton, Cleveland, Nov. 18 and 19. Balloon tires with their application and service problems, ethyl gas from the physiological and utility angles, and nitro-cellulose body finishes were the outstanding features of interest.

Supplementing these were the papers and discussions showing how service departments may be organized for the combination of real service and profit, also how the service department can fulfill its true function and contribute materially to the design of the product and the general policy of the company.

Prominent among those present were Alvan Macauley, president of the Packard Motor Car Co., who presided at the sessions of the first day; Henry M. Crane and Henry L. Horning, president and president-elect respectively of the Society of Automotive Engineers, and the service managers of many important car and truck manufacturers.

Attendance was nearly two hundred, with practically everybody present at all of the sessions. John Younger and Clyde Pelton of the Perfection Heater Co. presided at the sessions of the second day.

Intense interest was aroused by the informal talk on the subject of "The Effect of Ethyl Gas on Engine Operation" by Thomas Midgley, Jr., vice-president and general manager of the Ethyl Gasoline Corp. Before taking up the discussion of the set topic, he covered some of the points of general interest which have been aroused by the recent "Loony Gas" agitation which he ascribes to a misguided enthusiasm for sensational front page copy.

> "The poisonous effect of tetra-ethyl lead is but 1/20th of that of bichloride of mercury and much less than chlorine which is the basis of many water purification systems."
>
> —*Thomas Midgley, Jr.*

As the fuel is sold at filling stations, the ratio of ethyl fluid to gasoline is 1 to 1300. The products of its combustion in combination with gasoline are infinitesimal in effect, as compared with the carbon monoxide content of the exhaust. In fact, tests made by the United States Bureau of Mines have revealed positively no effect on either animals or humans.

The poisonous effect of tetra-ethyl-lead is but 1/20th of that of bichloride of mercury and much less than chlorine, which is the basis of many water purification systems. In its concentrated form, tetra-ethyl-lead can be absorbed by the human system with poisonous effect, but no more so than many other materials which are commonly used by the public.

Bayway Fatalities Caused by New Process

The recent fatalities at Bayway were the result of a new process which was being used in what is known as a semi-works plant as distinguished from the laboratory. However, the DuPont plant has been producing ten times the output of the Bayway plant without any ill effects on the workmen. More than 200,000,000 gal. of ethylized gasoline have been sold commercially without producing any deleterious effects in thickly populated communities or closed garages. From the operating and maintenance standpoint, Midgley stated that in a few years ethyl gas will have nation-wide distribution, at which time high-compression engines will be built by car manufacturers with a considerable effect on the conservation of the national fuel supply.

Ethyl gas when used in an engine leaves a slight amount of solid ash which passes out with the exhaust. In some engines which have deficient lubrication above the rings, some trouble may be experienced with exhaust valve lubrication and some sticking may result, as the solid ash tends to absorb the oily vapors of the exploded charge. However, complaints of hotter combustion and burnt valves, due to the use of ethyl gas, have no foundation of fact. Also no corrosive action is present, in spite of the discoloration which exists in the carbon deposit. When an engine shows a fuel knock, due to carbon deposit or high compression, ethyl gas is beneficial. Average figures have shown a mileage increase of about 9 per cent.

Service and Balloon Tires

—*James E. Hale*

Based on more than two years' acquaintance and experience with balloon tires, the paper entitled, "What the Service Department Needs to Know About Balloon Tires," presented by James E. Hale, manager of the development department of the Firestone Tire & Rubber Co., aroused a high degree of interest. The appendices of this paper are of particular interest to the readers of AUTOMOTIVE INDUSTRIES, as a considerable amount of

practical information has been gathered together and tabulated. Appendix 1 contains a tabulation of the balloon tire and rim sizes of various American cars and indicates the pressing need for standardization. To meet service needs a tire dealer is required to carry a diversified line of inordinate proportion before he has any chance of supplying customers' needs.

In Appendix 2, permissible wheel loads are plotted against tire sizes and inflation pressures. Mr. Hale states that the inflation pressure of the balloon tire must be regulated by the wheel load. A drop of 5 lb. in the air pressure will produce trouble if the tire is run for any long distance.

In Appendix 3, the results of a number of tests directed at the cause of front-wheel shimmy are tabulated. With the front springs blocked up, no shimmy can be produced. Standard tires inflated to the low pressures of balloon tires will show front end shimmy, while balloons inflated to the standard tire pressures indicate no shimmy. All three of these appendices are printed herewith.

The high spots of Hale's paper are contained in the following paragraphs. Outside of Ford business, Firestone is now building 75 balloon tires to every standard tire. With the balloon tire, the car is carried on air, while with the older type the side wall strength of the tire carried an appreciable portion of the load. Shot-gun tests, which simulate a blow-out at high speeds, indicate no danger from this source. This feature has been vindicated by the results of many millions of miles of operation at the hands of private owners. Steering resistance is a question of inflation pressure, since figures for standard and balloon tires at the same pressures are practically identical.

Slow-speed shimmy is caused in all cases by slack at some point in the steering gear, Mr. Hale says. High-speed shimmy is a complex subject. In some cases the rate of oscillation of the front wheels is as high as 40 per second. At the same time the frame rolls in synchronism. Wide tire bases do not eliminate shimmy. Center point steering, the inclining of king pins, the geometry of the steering gear linkage, the added weight of front-wheel brakes, all have bearing on the high-speed shimmy question, according to Mr. Hale. Rebound checks are to be recommended when balloon tires are used.

In taxicab service, the balloon tire indicates a reduced number of stops for flat tires in similar service conditions. The Firestone claim department has received complaints on but one balloon tire for every 5000 in service. Tight valve caps and adequate tire flaps are essential for the best results from balloon tires. Underinflation produces exceedingly rapid wear, bruise breaks and side wall breaking. The toe-in of the front wheels is recommended to be 1/8-3/16 in. Discussion of this paper became highly involved and included tire manufacturers, valve makers and service men.

Nitro-Cellulose Finishes
—*A. V. Pulsifer*

The session took on the aspects of a laboratory class when A. V. Pulsifer, vice-president of Valentine & Co., illustrated his paper, "The Influence of the New Nitro-Cellulose Paints for Automobiles Upon the Service Department," with a series of simple demonstrations to show the characteristics of the component materials of this finish and showed panels to indicate good and bad results. Various components, such as nitrated cotton, solvents, diluents, plasticizers and gums were discussed in relation to their effects on the finished job. Mr. Pulsifer emphasizes that a nitro-cellulose finish is an alloy rather than a series of laminated coats. Some colors give trouble, due to fading, and are difficult to keep at the original tint and luster, while others are highly satisfactory.

From the standpoint of the refinishing shop, attention must be given to the fire hazard, materials must be handled carefully and the refinishing department isolated from the general shop and ventilated by an exhaust system.

Electric Standardization
—*A. M. Dudley*

In the same session, A. M. Dudley of the Westinghouse Electric & Mfg. Co., discussed "The Standardization Work of the Automotive Electric Association—Its Possibilities in Simplifying Electrical Service" in a paper which is digested herewith:

"From the point of view of service, standardization would permit the service station representing several manufacturers to reduce considerably the number of spare units which it is necessary to stock in order to take reasonable care of demands for service which now come in on a multitude of models.

> "Outside of Ford business, Firestone is now building 75 balloon tires to every standard tire.
>
> "With the balloon tire the car is carried on air while with the older type the side wall strength of the tire carried an appreciable portion of the load."
>
> —*James E. Hale*

"Second, the motor car builder with limited production can use the same electrical equipment which is usual on similar cars of large production and so avail himself of the manufacturer's lower cost, resulting from such large production. To the service end in this case it means that in the smaller towns and along the highways smaller service stations with limited stock can render emergency service.

"When these ratings have been in general use for a time, it is hoped that further standardization of mechanical mounting methods and dimensions may be reasonably taken up. In the consideration of the motor and generator problem it became evident that good practice in the matter of installation and wiring should be recognized, and there were developed and adopted standard rules covering recommended practice."

In a paper entitled, "The Need for More Engineering in Service," George H. Duck, business manager of the *Commercial Car Journal*, emphasized the need for greater study of transportation service and the opportunity which exists for automotive engineers along the lines of organizing fleets to render the greatest economic service at the least cost. By this it is not to be understood that a motor truck draftsman can undertake the management of truck fleets, but that experienced engineers who know automotive engineering and transportation re-

quirements can make real places for themselves by proper selection of vehicles and close management of fleets. In this connection one automotive consulting engineer saved $95,000 for a client in one year.

Running a Service Department
—*H. N. Davock*

In the absence of H. N. Davock, service manager of the Packard Motor Car Co., Clayton Hill presented his paper, entitled "The Organization and Conduct of a Modern Service Department."

This paper is the résumé of two years' experience with a modern flat rate service plan which has been profitable to the company and has created satisfied customers, with consequent increase of service business.

Established merchandising principles and simplification of the car have been pronounced factors in the success of the plan. Parts prices have been reduced to meet legitimate competition and flat rates for various jobs have been reinforced by time studies which have evolved modern specialized equipment. The highlights of this paper are digested as follows:

As in any other form of merchandising, certain articles are sold at no profit, or even at a loss, while others carry a greater margin of profit. Displays of factory parts are made to compare them with inferior parts of other makes, but on competitive items or those which could be obtained equally well from outside sources the price is met.

Equipment and methods are based on production principles with more elaborate equipment for the recurrent jobs. Profits in the service department have increased from 1.3 per cent in 1921 to 11 per cent in 1924. In spite of the fact that prices have been reduced, the volume of business has held up, meaning that more jobs are handled. The service department profit for the past year at the branch houses has constituted 39 per cent of the total profit.

A service tool department revises shop practice from time to time and works out improved methods and equipment. Due to this, prices are revised twice each year. Service inventories have been reduced materially and service parts are run through the plant in better balanced schedules. The scheme is supported by frequent service meetings and the services of six travelers who call at dealers' places frequently. The turnover of service parts has been improved greatly and the cost of doing business has been reduced accordingly.

The company is about to start a merchandising school for service salesmen similar to that already maintained for car salesmen.

Truck Service Records
—*S. V. Norton*

Line and final inspection under the supervision of the service manager was one of the unusual features brought out by the paper. "Utilizing Motor Truck Service Records" which was presented by S. V. Norton, service manager of the General Motors Truck Co. This paper describes a comprehensive service scheme in which that

Firestone Front Wheel Wabble Investigation

Combination under test (No stabliators used)	M.P.H. at which violent shimmy occured					
Inflation	15 lb.	20 lb.	25 lb.	30 lb.	35 lb.	40 lb.
A—7.30 4-ply tires 4½" rim-unbalanced springs 318-lb., 354 lb., 35 lb. air in rear.	32	41	50	50	57	62-63
B—7.30 4-ply tires 4½" rim - balanced Springs 425 lb., 475 lb.	40-43	50-54	55	60	60-62	63
C—7.30 4-ply tires 4½" rim-unbalanced No springs in front 35 lb. air in rear.		OK to 60	OK to 65	OK to 65	OK to 65	
D—7.30 4-ply tires 4½" rim - balanced Springs 318 lb., 354 lb., 35 lb. air in rear.	33		48-50	50-52-53	58-60	60
E—7.30 4-ply tires 4½" rim-wheels unbalanced about 1½ lb. each. Springs 318 lb., 354 lb.	35-40		50-55			
F—6.75/21 6-ply tires 5" rim - unbalanced. Springs 318 lb., 354 lb.	37-48	43-45-47	52	58	61	63
G—33x5 6-ply tires 4½" rim-unbalanced Springs 318 lb., 354 lb., 50 lb. air in rear.			55	58	60	
H—7.30 4-ply tires 6" rim - unbalanced Springs 318 lb., 354 lb., 35 lb. air in rear. Play out of Steering Gear.	37	43	50	55-57	62	Unsteady 67
I—7.30 ply tires 4½" rim - balanced Springs 318 lb., 354 lb. Front brakes removed.	45-50	55	60	65	OK to 62	OK to 65
J—7.30 4-ply tires 4½" rim - balanced Springs 318 lb., 354 lb. Play taken out of Steering Gear.	35	43	48-51-52	50-52	56-58	
K—7.30 4-ply tires 4½" rim - balanced Springs 318 lb., 354 lb. King pin set forward at bottom about 2°.	38	40-53	50	55	57-59	60

Current Requirements of Balloon Tires and Rims for Original Equipment

Tire Section	Rim Dia.	No. Plies	Rim Section	Car Manufacturers Using
4.40	21	4	3½	Ford, Gray
4.95	20	4	4	Star
4.95	22	4	4	Buick, Overland, Oldsmobile
5.25	20	4	4	Durant, Flint, Gardner, Maxwell, Moon
5.25	21	4	4	Anderson, Auburn, Cleveland, Rollin, Columbia, Essex, Elcar, Franklin, Gardner, Hupp, Jewett, Lexington. Moon, Willys-Overland
5.25	21	4	4½	Nash, Studebaker
5.77	20	4	4	Dodge, Maxwell
5.77	20	6	4	Auburn, Chrysler
5.77	22	6	4½	Apperson, Buick, Rickenbacker
5.77	22	6	4½	Apperson, Buick, Pierce-Arrow
6.00	20	4	4	Velie
6.00	21	4	4	Velie
6.00	21	4	4½	Chandler
6.00	21	4	5	Nash, Stearns
6.00	21	6	4½	Chandler
6.20	20	4	4	Anderson, Elcar, Moon, Reo, Westcott
6.20	20	4	4½	Auburn, Case, Flint, H. C. S., Haynes, Jordan, Kissel, Lexington, McFarlan, Meteor, Marmon, Premier, Sayers-Scovill, Stutz, Wills Ste. Claire, Willys-Overland
6.20	20	4	5	Studebaker
6.20	21	4	4½	Hudson, Packard, Peerless
6.75	21	4	4½	Apperson, Paige, Stearns
6.75	21	6	5	Lincoln, Peerless
6.75	21	6	6	Cadillac
7.30	20	4	4½	Case, Cole, McFarlan, Meteor, Marmon, Pierce-Arrow, Sayers-Scovill
7.30	20	4	5	Cunningham, Packard, Studebaker

department accepts rather than shifts responsibility. Mr. Norton said in part:

"By means of these reports, which are being used more and more by our field organization, we have been able to analyze complaints according to territory, model and kind of business.

"Another valuable means of securing information is through letters we receive from truck operators. The replies to these letters, and all other letters of complaint from truck operators are handled by the service department and followed up through our nearest branch or distributor.

"To keep in close touch with field service conditions we maintain a crew of four traveling service representatives who call on the branches, distributors and dealers in their respective zones approximately once every three to four months.

"We also have two field men in reserve at the factory to answer emergency calls when necessary. These field service men send us written reports of the calls they make.

"All the complaints described above are recorded in the service complaint file by the technical division of the service department.

"Information as to the performance of our trucks and methods of servicing them is also obtained from service conferences.

"The records of the claim division constitute an important means of securing information relative to the reported failure of parts and assemblies in our trucks. Many of these records are included in the service complaint file."

The concluding paper of the meeting was apropos of one of the outstanding service and manufacturing problems of the day. Men of real training and knowledge are becoming rarities in most communities and along with organization and modern service methods, the mechanic is one of the essential parts of the program. In his paper, "The Training of the Mechanic," John Younger analyzed some of the methods already in use for training mechanics and made suggestions of possible ways to enlarge this field of effort. He said in part:

"Actual statistics show there are some 55,000 repair men, but they do not tell us what percentage of them are real mechanics and what percentage simply 'duds.'

"There are at least two main methods of training mechanics. First, at a central point as, for example, a manufacturing establishment, and secondly, at the local headquarters, either city or dealer's establishment. Both methods may be satisfactorily combined.

"The high schools are the proper place to teach the elementary fundamentals of the business and if for some reason or other a young man should change his mind after graduating there are the Y. M. C. A. and K. of C. schools and the private schools like our own Cleveland Automobile School or the Detroit Automobile School or the Sweeny School at Kansas City. All are doing good work and manufacturing service stations should cooperate with them to see that it is improved and developed in accordance with the times.

"There is, of course, another means of spreading this information, and that is through the technical press. Dealers should be encouraged to pass copies of trade papers around the shop and not let them lie on the customer's table in the waiting room as far too many do."

Air Pressure Schedule for Balloon Tires

Air Pressure Lbs.	4.40 4-ply	4.75 4-ply	4.95 4-ply	5.25 4-ply	5.77 4-ply	5.77 6-ply	6.00 4-ply	6.20 4-ply	6.75 4-ply	6.75 6-ply	7.30 4-ply	7.30 6-ply
						Wheel Loads						
20	...	...	...	600	700	...	700	750	850	...	950	...
21	450	500	550	...	...	...	...	800	900	...	1,000	...
22	...	...	...	650	750	...	750	850	950	...	1,050	...
23	500	550	600	...	...	...	...	...	1,000	...	1,100	...
24	...	...	...	700	...	700	800	900	...	850	1,150	...
25	...	600	650	...	850	...	...	950	1,075	900	1,200	1,000
26	550	...	...	750	...	...	850	...	1,100	...	1,250	...
27	...	650	700	...	900	800	900	1,000	1,150	950	1,300	1,075
28	600	...	...	800	950	...	...	1,050	1,200	1,000	1,350	...
29	...	700	750	850	...	850	950	...	...	1,050	1,400	...
30	...	...	...	...	1,000	...	1,000	1,100	1,275	...	1,450	1,200
31	650	750	800	900	...	900	...	1,150	...	1,100	1,500	...
32	...	...	...	...	1,050	950	1,050	1,200	1,350	1,150	1,550	1,275
33	700	800	850	950	1,100	...	...	...	1,400	1,175	1,600	...
34	...	...	...	...	...	1,000	1,100	1,250	1,450	...	1,650	1,350
35	750	850	900	1,000	1,150	1,025	1,150	1,300	1,500	1,250	1,700	1,400
40	...	...	...	...	...	1,175	...	...	...	1,425	...	1,600
45	...	...	...	...	...	1,325	...	...	...	1,625	...	1,800
50	...	...	...	...	...	1,475	...	...	...	1,800	...	2,000

How the Gasoline Tax Is Working Out

GASOLINE taxes ranging from 1 to 3 cents a gallon are levied in thirty-six States and the District of Columbia. In a great majority of these States this tax provision has been in operation for less than a year.

"It is as popular as a tax could be," according to a statement by James W. Martin of Emory University, Georgia, in his survey of gasoline taxes which appeared in pamphlet form as a supplement to the October number of the National Municipal Review. Mr. Martin points out that the expense of collecting is phenomenally small, averaging 0.26 of 1 per cent in those eight States which levy a tax of 3 cents on the gallon, and 0.74 of 1 per cent in the fifteen States which levy a tax of 1 cent on the gallon.

"Tax at the point of greatest concentration within the taxing unit" and "Collect as near to the ultimate consumer as is possible, thus avoiding the expense of shifting the tax" are the two principles involved in administering commodity taxation, Mr. Martin says. He admits that in this case they conflict.

The point of greatest concentration within the State is the point of entry for the importer or the plant of the manufacturer. The cost of collecting from an individual or small group of individuals is obviously less. On the other hand, the retailer is closest to the ultimate consumer. As a matter of fact, in those States which allowed the tax to be paid by either the oil company or the retailer, the larger companies preferred to pay the tax in order to get the business of the smaller retailers.

The purpose of the tax was to provide funds for building and maintaining roads in proportion to the amount an individual used them. In most States gasoline taxes are kept in a separate fund.

For the man who uses gasoline for stationary engines, for manufacturing or for tractors, Mr. Martin says, the tax is unquestionably not equitable.

What Factors Are Involved in Determining Machine Tool Buying Policy?

Tools cannot be bought as a commodity. First cost is not necessarily important, for equipment represents investment and not merely operating cost.

By Harry Tipper

IN no department of factory buying is the stability and character of the supply source of more importance than in the buying of manufacturing equipment. The progress in the art of manufacture is very largely dependent upon the stability, engineering capacity and probity of the manufacturer who supplies this equipment.

Tools cannot be bought as a commodity; the cost and progress of the production is too intimately governed by the operation and the construction of the tool itself. The first cost is not necessarily an important element in the development of a buying policy in connection with this type of equipment. The production position of the manufacturer in his ability to constantly improve the efficiency of his manufacturing should govern the buying of his manufacturing equipment.

All such equipment represents investment and not operating cost merely. The long swing is the important viewpoint in the consideration of its value and suitability, consequently the factors involved in a buying policy are different from those required in the purchase of materials or supplies. These factors are:

1. Improvement in operating method,
2. Improvement in design,
3. Character of construction,
4. Character of supplying organization,
5. Relative investment cost.

There are two main reasons for the buying of manufacturing equipment, which to some extent vary the value of these factors in relation to each other. These two are—extension of manufacturing and replacement of equipment, through depreciation or obsolescence.

Extending Manufacture

In the extension of manufacturing the same factors hold good, with the exception that the relative cost is determined by the comparative value of different pieces of new equipment which might be bought for the same purposes. Where, however, the buying of the new equipment is to be considered from a standpoint of depreciation and obsolescence to replace the present equipment another factor enters in; that is the comparison involved in the cost of the new equipment as against the repairs and maintenance of the old and the relative production efficiency of the two methods.

Comparisons in machine equipment are not subject to the same simple factors that are involved in the buying of raw materials or supplies. Steel of a certain specification and composition, developing certain tensile, compression and other strengths, and rolled by certain processes can be very readily compared from the factors of price, uniformity and suitability. The machine tool, or any other piece of machine equipment is more complicated—permits of a larger variation in design, in the character of construction and in the exact suitability, and therefore more factors must be taken into account in establishing the comparative value of the machines offered, from which the buyer must choose.

This analysis is further affected by the relation between the cost of operation, the cost per unit of output and the investment cost of the machine itself. There is a general belief that intensive competition, largely on price, has a tendency to force improvements in the design and construction in mechanical contrivances, but this is only partly and incidentally true. As the scientific problem of improvement becomes more complicated and the research more costly, time and effort can be devoted to this work only in proportion to the stability and financial capacity of the organization.

Suffers Violent Fluctuations

No business has suffered of late years larger and more violent fluctuations than the business of making machinery for manufacturing. Machine tools, machinery for conveying, handling and for specialized industries of all kinds have been bought without any regard to the requirements of such an industry, and to the advantage of stable sources.

In the good years when the manufacturing industries have been prosperous, there has been a tendency to invest in new equipment to a very large degree, and in poor years such buying has practically ceased.

These conditions are ultimately bad for the manufacturing buyer, and bad for the machinery builder. They do not permit of the steady development of improved methods, which could be encouraged by more effective relations between buyer and seller. They do not properly serve the purpose of the manufacturing buyer in his own business, because it is necessary for him to produce in bad times under the disadvantage of equipment which ought to be replaced, and in good times the production is interrupted by too large an addition and replacement, which affects the manufacturing processes.

Now that the automobile business has practically passed out of the era of rapid expansion, it is in the era when the fluctuations are likely to be more important from a profit and loss standpoint. It is desirable that investment requirements in the way of new machinery should be studied in their probable developments over a period of years and the progress of investment for depreciation and extension laid out so that it will be more constant in its developments and more effective in its relation to its manufacturing necessities. Fundamentally, the value of a piece of machinery in the manufacturing plant is the comparative relation of its output, its overhead and working costs, its idle time, its flexibility, expressed in their relation to price.

These elements enter into the question of the depre-

ciation which is allowed, the advisability of repairing and rebuilding the machinery already in use, and the extent to which this process could be carried. Usually it is easier for the production executive to secure an appropriation for rebuilding than it is to secure an appropriation for new equipment, particularly in poor times. When the actual costs have been drawn up in comparison with the actual output, there are a good many cases where machinery has been rebuilt and kept at work in the factory, when a thorough examination of all costs would have led to the conclusion that new equipment was indicated.

It is interesting to note how far price has been permitted to affect the consideration in the buying of machinery equipment in the automotive field, and the way which this has been changing in the last year or so, since the question of machine investment has been discussed more freely. Price is really the last factor of importance in considering machine tool equipment, and it is only useful when it has been taken in relation to the output, the costs and the suitability of the machine itself.

Constantly Improving Relations Needed

The desirable relation between the manufacturing buyer and the machinery builder is the development of steady and constant improvement in the capacity, character and efficiency of the machine, the steady and constant rearrangement of the machinery equipment, so that the improvement can be welded into the processes without undue change in the functions themselves, or the departmental activities within the factory.

These desirable relations call for a sufficiently stable condition of business in the machinery field, to provide the proper research and investigation, the proper engineering contacts with the buyers, and the required amount of engineering service in connection with the installation and operation of the equipment. Such conditions cannot be secured if the buying is to be spasmodic, irregular and governed considerably by the price.

There is little or no incentive for the manufacturer of machinery to stabilize his own production methods and his own engineering development, unless he can see a reasonable length of stable business in front of him. In the last few years he has been obliged to close his factory, to work on 10, 20, 100 per cent and on a 50 per cent ratio.

No organization can be kept together at reasonable efficiency under these conditions, and no proper regard to improvement in the productive capacity of the machine can be developed when the future is so uncertain. The automotive industry is by far the largest user of many types of machine equipment, so much larger that in some cases its use is equal to that of all the other metal trades combined.

Machinery Industry of First Importance

The automotive buyer needs a constantly improving, stable and efficient machinery industry more than any other group. Upon this largely depends the improvement in its own processes and costs, upon this largely depends the effectiveness and value of his own investment in manufacturing equipment. Consequently intelligent analysis and an intelligent consideration of all the factors should govern the buying policy at all times.

The requirements of investment items of this kind and particularly the equipment which is concerned with the processes of manufacture should be known and charted sufficiently in advance to enable the extension and replacement to go on with a reasonable amount of regularity, and with the least disturbance to the manufacturing schedules. The proper attention should be given to the variation in details of operation and construction, which in themselves will affect the operating cost, the output, or the depreciation.

The methods of comparison should be scientific rather than commercial and the buying should be based upon the scientific and financial considerations rather than the commercial and trading requirements. In other words, the suitability of any piece of machine equipment is a matter of engineering, cost analysis and investment, it is not intrinsically a matter of market and price.

Of Interest to Automotive Buyers

The fluctuations in the machinery building industries are not only matters of disturbance and difficulty to those concerned in the industry, but they are matters of interest to the automotive buyer who must eventually pay all the costly charges made necessary by these rapid and violent fluctuations. The buyer must eventually be saddled with all the expense of rebuilding organizations that have been scattered, rearranging engineering work which has been dropped for want of business and manufacturing developments which must be recharted because there is no sufficient consideration of the costs which are indirectly a part of the buyer's problem, although they are directly involved in the expenses of the seller.

This is particularly true where the items are matters of investment and of operating importance. The position of the market may be of great importance in the buying of raw material and the tendency of its movement up or down requires close consideration, but the equipment which is expected to last a number of years and expected to represent a maximum operating efficiency, does not need to be bought because the market is good, or to be eliminated because business is bad.

It will always be necessary to replace machine equipment more fully during prosperous times and to restrict replacement during poor times, but there is no reason for the habit of massing the replacement buying when the business is good and practically eliminating it when the business is bad. The automotive manufacturer will be much better off when this is changed, and the machinery manufacturer will be able to serve him more adequately and more efficiently as this situation is brought more into line with sound cost and investment policies.

New Automatic Grease Cup

A GREASE cup designed to supply semi-liquid lubricant to chassis parts at a constant rate has been put on the market by the National Automatic Grease Cup Company, 1603 Michigan Avenue, Chicago. This cup, which is made of heavy material, screws into the oil cup holes provided on the chassis, and it may be fitted at the intake with the fittings used for attaching any standard make of grease gun. The manufacturers state that the cup will hold semi-liquid lubricant enough for two to three thousand miles of operation. A visible gage shows the degree of fullness of the cup. A valve is provided for regulating the flow of lubricant, and the manufacturers claim that when it is once properly set, it will work accurately. One of the chief advantages claimed for this cup is that it makes it possible to supply semi-liquid grease to the moving parts of the chassis.

Five Steel Companies Using the Electric Method of Melting Agree to Anneal All Castings

Research group formed which will turn out only fully annealed castings unless otherwise ordered. Advantages claimed are better machining qualities and greater resistance to shock loads.

FIVE steel foundries, all employing the electric method of melting, have organized the Electric Steel Founders Research Group which aims to improve the product of steel foundries and increase the faith of the buying public in it by methods somewhat similar to those which have been so successfully employed by the malleable iron founders. The five members of this group are the Ft. Pitt Steel Castings Co., McKeesport, Pa.; the Lebanon Steel Foundries, Lebanon, Pa.; the Michigan Steel Castings Co., Detroit; the Nugent Steel Castings Co., Chicago, and the Sivyer Steel Casting Co., Milwaukee.

Some idea of the lines along which the Group is working may be obtained from a convention paper by H. A. Neel dealing with the effect of annealing on steel castings and its importance to the user. Following is an abstract of this paper.

If a piece of glass is broken and examined afterward, it will be seen that the fracture is of uniform appearance, due to the fact when glass changes from a hot liquid to a cold solid the relation of its various components does not change.

If a piece of steel is fractured and examined, it will be perceived that the broken face exhibits the sparkling facets of the crystals of which it is composed. When steel passes from a liquid to a solid state its constituents no longer hold the same relation to each other. Instead of being an "amorphous" or formless mass, it is composed of crystals imbedded in a setting corresponding to the cement which holds concrete together. In well-made concrete, the pebbles will break in two before they will pull loose from their setting. Similarly in steel, rupture occurs through the crystals and not around them. The cement holding the crystals together is stronger than the crystals.

The problem of the steel maker is to so control the relation between the crystals and the cement that maximum physical properties result.

Size of Steel Crystals

The size of the crystals formed, when steel cools from a liquid to a solid state, is dependent on the rate at which cooling takes place. Rapid cooling in thin sections produces much finer crystals than slow cooling in heavy sections. It is possible, however, to break down the diversely crystallized structure of steel as cast and produce a uniform structure throughout the casting, at a temperature well below the melting point.

The lowest temperature at which a change of structure can take place in cast steel is about 1400 deg. F., but if the temperature is carried up to 1650 deg. F. the change is accomplished much more rapidly.

Annealing, as practiced by members of the Research Group, means "heating of castings to a temperature between 1600 and 1650 deg. F., and maintaining them at that temperature a sufficient length of time to insure maximum grain refinement."

The Group Inspection Standards require that "All castings, except only such as are stipulated by the customer to be delivered to him in the raw or unannealed condition, shall be heat treated, as prescribed in paragraphs 27 to 31 inclusive."

The effects of annealing steel castings are as follows:

1. Increased physical properties.
2. Relief of strains set up in cooling and in any welding operation.
3. Increased machinability.

Tensile Strength and Elasticity

The tensile strength determines the load that a given part will carry, and the elasticity determines its ability to withstand shock. In practically all applications of cast steel, both properties are called into play. Annealing is carried on primarily to increase the elasticity or shock-resisting power of steel castings. The ultimate strength is only slightly changed by ordinary annealing, but the working strength, or yield point, is materially increased in comparison with unannealed castings. Also the ductility, or ability to bend or stretch without breaking, is raised by 50 to 100 per cent. Proper annealing is a guarantee to the customer that a given cross section of a casting will withstand a much greater amount of abuse than a similar section of an unannealed casting.

In changing from a hot liquid to a cold solid, steel shrinks one-quarter inch per foot. This change in size results in cooling strains. The more complicated the design of the casting, and the more resistance offered to contraction by cores, etc., the greater will be the strains set up. Annealing, by returning the casting to a state of plasticity and subsequently cooling it at a uniform rate, eliminates such cooling strains and obviously decreases the likelihood of failure due to applying a load to a piece already in a state of internal tension. Every welding operation, by heating a small part of a casting to the melting point while the balance remains cold, sets up strains similar to the original cooling strains. Hence, our inspection standards require annealing after any welding operation, "even when this necessitates one or more supplementary heat treatments."

Machinability is dependent partly on two factors, degree of hardness and uniformity of hardness. The annealing operation actually reduces the degree of hardness by from 20 to 40 points on the Brinell scale. It also serves to free the surface of foundry sand that adheres too tightly to be removed by sand blasting.

By the relief of strained and chilled parts of castings, the whole mass is brought to a common hardness so that a tool will pass uniformly across or through any section without jumping or chattering.

Just Among Ourselves

"Leaders" in Car Marketing

"LEADERS" have been commonly used in the grocery and dry goods trade for years. Everybody is familiar with the low-priced item advertised prominently on the grocery store window to get people to come in and to arouse their interest in the other goods the merchant has to sell. The same method has been used to some extent in selling automotive accessories, but up to now, so far as we know, it has not been applied to passenger car lines. It is said, however, that at present one low-priced closed model is being sold with practically no profit to the factory as a "leader" for the line. It will be interesting to see how the experiment works out in this field, which is considerably different from those in which the items involved are almost all small and inexpensive in character.

Back-slapping and Sales Education

"WANT to know what's been the matter with a lot of automobile selling, both factory and dealer?" queried the office philosopher the other day as he lit on the edge of a chair in my office for a moment before going on to solve the problems of the world. It was evident that we were going to be told whether we wanted to be or not, so we meekly answered "Yes." "Well, try to get across a bit of educational stuff sometime that requires some real study. You'll find too many fellows saying, 'I've got personality. What do I need with education?' "—and he was on his way. Maybe there's something in it.

Romance Is Not Dead and Never Will Be

THERE'S always going to be a place for the "something different" in motor cars. Utility and usefulness certainly are the basis of automobile progress, but the desire inherent in almost everyone for something that his neighbor hasn't got means that the small company, specializing in novel designs and colors, will continue to be a factor in the industry. A British advertiser caught this note very effectively when he said recently in his copy: "Motoring palls after a time, doesn't it? Your friends and others now take 'the car' for granted. Even in your own heart this once enchanting possession arouses no spark of enthusiasm. You suppose you are fortunate in owning a car—it's convenient—but *Romance!* * * *" and so on to the natural conclusion that one should buy the car built by his company. Not only in the small production cars, but also in the widely sold lines there seems likely to be a renewed attempt soon to add something of glamor and romance to the drab urge of utility which is necessarily the basis of motor vehicle buying and selling.

Playing at Work and Working at Play

"TOO much play and too little work. That's one of the main troubles with business today. Too many holidays and too much golf. That's what's the matter." The author of these remarks —or something very much like them—is one of the most widely known automobile salesmen in the country. Don't know whether he is right or not, but at least he thinks the same as another prominent automotive executive quoted in the *American Mercury* a short time ago. In an article, entitled "The King of Loafers," William Feather, after quoting this unnamed executive, proceeded with a brilliant — if rather sharp — arraignment of the big business a man who damns workers for not wanting to give a full day's work for a full day's pay and then spends half his time on a golf course or at a baseball game and the other half attending conventions where the mental effort applied usually is well within the legal limit of one-half of one per cent. Scathing remarks of this kind don't apply to you or me, of course, but I know several fellows that might profit by them. Don't you?

The Car She Wants Is the Car She Gets

WITH competition too keen to permit of doubtful design, it is the woman who often decides on what car to buy. The astute manufacturer is guided by the questions she asks at the shows and in the showroom. At the London Show—and English women have less economic freedom than American—she asked about style, color, comfort and convenience. Men asked about costs and economy of operation. The woman usually decides, whether she declares openly for a certain make or model or cleverly leads a man to choose the car she has already determined on. The car she wants is the car she gets!

Another New Use Devised for Cars

MOTORIZED funeral processions are just coming into vogue in China according to Trade Commissioner G. C. Howard. The motor hearse is followed by a motor Jao-tze, the latter being a specially built vehicle on which is placarded a picture of the deceased whose body is carried in the hearse. Sometimes an ordinary American car is used as a Jao-tze, the picture being propped up on the back seat. Somebody is always finding new uses for the automobile, although it must be admitted that cars bearing large individual photographs in American political parades often have carried pictures of dead ones before this.

N. G. S.

Danger of Scuffed Pistons and Oil Dilution Reduced by Gasoline Preheating Devices

In starting a car cold only the most volatile portions of present day fuels form ignitable mixtures. Flooding engine is necessary unless preheating arrangement is provided.

By P. M. Heldt

ONE of the problems that is constantly with us in the automobile industry is that of facilitating the starting of engines in cold weather. Not only is the engine much harder to crank when the temperature is very low and the capacity of the battery for furnishing starting current is reduced, but the fuel which is injected into the air stream does not vaporize to any extent, and consequently no readily ignitable mixture is formed. The mixture that is formed will be exceedingly heterogeneous, and it may require cranking for a considerable time until finally the mixture in the vicinity of one of the spark plugs happens to be of the right proportion and the charge is fired. But even after the engine has been started its operation for some time will be very irregular. There is likely to be back-firing through the carbureter, and the engine probably will develop very little power.

By keeping the car in a heated garage and always a blanket over the bonnet when the car is allowed to stand on the street for some time, trouble of this kind can be eliminated to a considerable degree, but many cars are being kept in unheated garages and are allowed to get cold during stops on a trip, and the designer naturally must try to make starting fairly easy even under extreme conditions.

The chief help in starting in cold weather with most cars is the choke. If we examine a distillation curve of gasoline as it has been marketed in this country for the past several years, we find that about 5 per cent distills over at below 150 deg. F., whereas to distill the whole of the fuel generally requires a final temperature of about 450 deg. Therefore, by drawing into the cylinder, say, twenty times as much gasoline as would be required to form a combustible mixture of chemically correct proportion if all of the gasoline were vaporized, we need to vaporize only that portion which distills at below 150 deg.

Temperature of Combustible Mixtures

Of course, if a temperature of 150 deg. were required to vaporize this fuel there would be little chance of accomplishing the object when the air drawn in is at a temperature of below zero Fahrenheit, but, fortunately, such a temperature is not necessary. A temperature of 150 deg. would be required to insure the continuance of the conversion of the liquid fuel into a gas if the liquid were covered with an atmosphere consisting entirely of vaporized gasoline.

At a temperature of 150 deg. F. the least volatile portion of the first 5 per cent of the fuel to distill over has a vapor pressure equal to one atmosphere or 14.7 lb. p. sq. in. A combustible mixture of gasoline vapor and air, however, consists of substantially 15 parts by weight of air and only one part of gasoline vapor, and the partial pressure of the gasoline vapor in a combustible mixture of the above proportion therefore is only one-sixteenth of the total pressure.

If we consider the combustible mixture in the inlet manifold and in the cylinder during the inlet stroke, the pressure is somewhat less than atmospheric, as otherwise no suction could take place. Of course, when the engine is being cranked it is turning over at low velocity only and the degree of vacuum in that case is not very high. We will be justified in assuming that the mean pressure in the inlet manifold and the cylinder during the inlet stroke is 0.8 atmosphere or $0.8 \times 14.7 = 11.8$ lb. p. sq. in.

The partial pressure of the gasoline vapor in this mixture will be $11.8/16 = 0.74$ lb. p. sq. in.

Calculation of Minimum Temperature

Now, it can be found from tables of vapor pressure that the same gasoline which has a vapor pressure of 14.7 lb. p. sq. in. at 150 deg. F. has a vapor pressure of 0.74 lb. p. sq. in. at about 30 deg. F. or slightly below the freezing point.

Therefore, if the air in the inlet manifold and the cylinder during the inlet stroke is at about 30 deg F., an ignitable mixture will form with commercial gasoline if about twenty times the normal proportion of gasoline is present in the mixture. If the temperature of the air and the gasoline is still lower then a still greater proportion of fuel to air is required in order to form an ignitable mixture.

As the engine is being cranked by the starter, fuel is constantly being sucked into the cylinders, and although some of this fuel passes out during the exhaust stroke, the proportion of fuel to air in the cylinder undoubtedly increases all the time the engine is being cranked. Therefore, if the temperature of the air and gasoline is so low that all of the components of the fuel present in the cylinder which have a vapor pressure of not less than 14.7 lb. p. sq. in. at 150 deg. F. will not vaporize, then ignition will be delayed until the amount of still more volatile components accumulated in the cylinder is sufficient to form a combustible mixture.

The fuel fraction with a vapor pressure of 14.7 lb. p. sq. in. at 150 deg. F. corresponds to hexane (C_6H_{14}). There are still more volatile compounds included in commercial gasoline, such as pentane, (C_5H_{12}) and butane (C_4H_{10}), and these will enable the engine to start at temperatures considerably below the freezing point if a sufficient amount of gasoline is supplied to the cylinder.

The above describes the principle which makes it possible to start an engine in cold weather in the usual way. After the engine is once started, heat is generally supplied from the exhaust to the carbureter air or to the mixture in the inlet manifold, or by means of a hot spot to any particles of liquid fuel that separate out from the

mixture. But this heat is not available while starting the engine.

Objections to Excessive Choking

There are several objections to the introduction of a great excess of gasoline into the engine cylinders, as above described. In the first place, the bulk of the fuel that enters the cylinders while the choke is in action passes through the engine unconsumed and therefore represents waste. Some of the excess fuel will dissolve the oil on the cylinder walls and thus interfere with the lubrication of the cylinders. It will even pass by the pistons and get into the crankcase, where it will dilute the supply of oil, impairing its value as a lubricant. Frequently when the choke is used and an excess of fuel is drawn into the cylinder in consequence, after the first charge is fired in any cylinder the heat resulting from the explosion will help to vaporize the fuel and for some time thereafter the explosive mixture will be over-rich and produce a smoky exhaust. Under these conditions, that is, whenever the engine runs on a rich mixture, a considerable amount of carbon monoxide is formed, which is the poisonous constituent of exhaust gases which occasionally causes death when an engine is run for any length of time in a small closed garage.

The chief objection to the present method of starting, by causing a very large excess of fuel to be drawn into the cylinders by the use of the choke, is that it results in rapid dilution of the crankcase oil and all the evils which this entails. The remedy obviously is to supply heat to the combustible charge or its elements right from the start, but what is not so obvious is the way in which this can be most conveniently and most advantageously done.

Preheating Manifold

In burners using heavy hydrocarbon fuels, such as kerosene torches, it is customary to pump a small amount of the fuel into a trough underneath a vaporizer into which the fuel is later sprayed, and burn this liquid fuel in the air, thereby heating the vaporizer. This method could be applied also to automobile engines, by arranging a trough underneath the inlet manifold, into which fuel from the main tank could be pumped and then ignited by a match.

There are various objections to this plan. In the first place, it is rather tedious. We are so accustomed to letting in the clutch and driving off immediately after a few preliminary operations that any process of preparation which consumes, say, five minutes, seems to be too slow and impractical.

Other objections are that the hood has to be raised before the engine can be started, that the paint on the hood might be damaged by the heat of the flame and that there is a certain fire hazard connected with the use of an open fire in the garage and on the car.

The provision of an independent heater built directly into the power plant to overcome some of the objections mentioned in the foregoing was first attempted by John Good of the Good Inventions Co., Garden City, N. Y., nearly ten years ago. Mr. Good has developed a number of different heaters adapted to different conditions. His earliest construction, which comprises a small blower driven by an electric motor, is shown in Fig. 1. The inlet manifold is surrounded with a jacket and to the jacket wall at its lower end is bolted a double walled combustion chamber. Air from the blower first enters the jacket space formed by the double walls of this chamber and then passes through a series of small openings in the inner wall into the combustion chamber proper.

To the bottom of the combustion chamber is bolted a float chamber which has a pipe connection to the fuel line of the carbureter. A fuel standpipe or nozzle extends up from the float chamber to the heater combustion chamber, and the points of a spark plug screwed into the combustion chamber wall are located close to the mouth of the nozzle.

With the blower in operation, air is forced into the jacket of the combustion chamber and passes thence through the small openings in the inner wall into the combustion chamber itself, and at the same time fuel is drawn from the nozzle and mixes with the air in the vicinity of the spark plug points, forming a combustible mixture which is ignited by the sparks. There is then a continuous flame in the jacket of the inlet manifold as long as the blower remains in operation, heating the walls of the manifold, the products of combustion passing out of the jacket through a flexible exhaust tube at the top, which can be extended to discharge at any point desired.

The richness of the mixture fed to the heater can be adjusted by means of a screw which controls a communicating passage between the float chamber and the jacket of the combustion chamber, and thus permits of varying the pressure acting on top of the fuel in the float chamber.

The burner consumes fuel at the rate of 21-24 oz. per hour. Normally the blower is operated for 10 sec. Operating the blower consumes 20 amp. at 6 volts.

A blower of this type fitted to a Buick engine is illustrated in Fig. 2.

A later model in which the motor-driven blower was replaced by a hand pump is illustrated in Fig. 3. An air pump of the leather cup type is located in an air chamber which serves to even out the pulsations of the

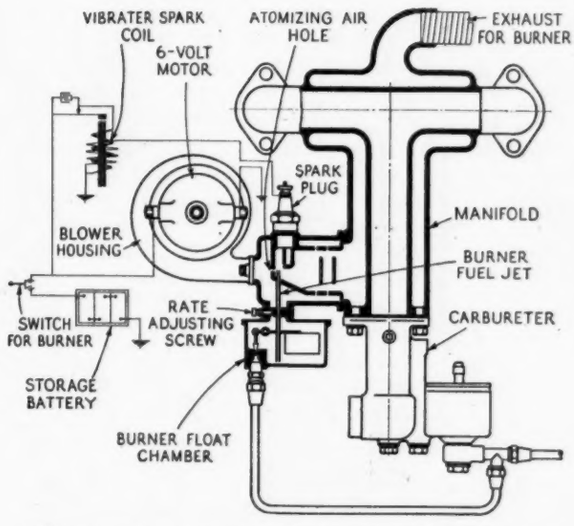


Fig. 1—Good starting device comprising blower driven by electric motor

pump. Air from this receiving chamber passes through an air nozzle and past the top of a fuel nozzle connected to the carbureter float chamber, forming a combustible mixture which enters a combustion chamber formed integral with the carbureter body. A spark plug screwed into the wall of the chamber ignites the mixture and the gases of combustion pass out partly through a valve on top of the chamber, around which is a flame-extinguishing device to remove all danger of fire, and partly through a coiled tube located within the chamber. The lower end of this coiled tube communicates with the combustion chamber of the heater so that the flame can

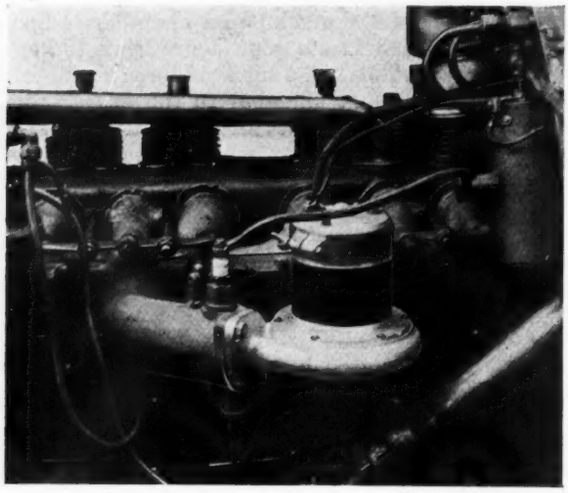


Fig. 2—Early model of Good starter fitted to Buick car

get into the tube. Into this same end of the tube extends an air-bled fuel nozzle, the lower end of which is located in a well communicating with the carbureter float chamber. The purpose of this fuel nozzle is to furnish a rich slug of fuel for starting, which is immediately vaporized by passing through the heated coil, and thereafter to supply a small amount of fuel to compensate for the excess air which passes through the burner during running. This additional mixture serves to automatically increase the idling feed slightly, in order that the motor may not stall in extreme cold weather. The top end of the coiled tube communicates with the inlet manifold, through a shut-off, which can be opened and closed from the dash through a wire control.

In order to furnish current to the spark plug in the heater chamber the ignition spark coil has both ends of its secondary winding insulated and one secondary terminal of the coil is connected to the heater plug while the other leads to the distributer. Thus the plug in the heater chamber is connected in series successively with each spark plug in the engine, and no extra equipment is required for firing the charge in the heater chamber. As this charge is not under compression, placing the heater chamber plug in series with the regular ignition plugs does not add greatly to the voltage which the coil must produce.

The procedure of starting is as follows: The operator opens the shut-off valve, presses the starter switch and at the same time operates the hand pump. This results in the combustible mixture being ignited and heating the coil. The suction of the engine draws some of the burned gases through the coil, together with the rich starting slug. After the engine has started the heater will continue to burn as long as the shut-off valve remains open, because the burner chamber has both an air inlet and a fuel nozzle, and the suction in the inlet manifold will be communicated to it and draw in a combustible charge. The rate of fuel consumption under these conditions is 9 oz. per hour. When the heating effect is no longer required the shut-off valve is closed and the heater thereby extinguished, but the action of the spark plug in the heater chamber continues and the heater can be restarted instantly by merely opening the shut-off valve.

A somewhat simpler device due to the same inventor and known as the prime-start burner is shown in Fig. 4. Here the pump is dispensed with, but by means of a conical valve operated from the dash the inlet manifold is primed at starting through a priming tube extending into a fuel well alongside the carbureter float chamber. If the carbureter throttle is nearly or completely closed, there is evidently a considerable vacuum in the inlet manifold when the engine is being cranked over by the starter, and this, together with the supply of fuel in the well and the size of the priming tube and the valve passage, insures a comparatively rich mixture for starting. The combustion chamber is equipped with a weighted air valve to control the burning rate, thus compensating for differences of suction in the manifold.

After the priming valve has been allowed to close, fuel

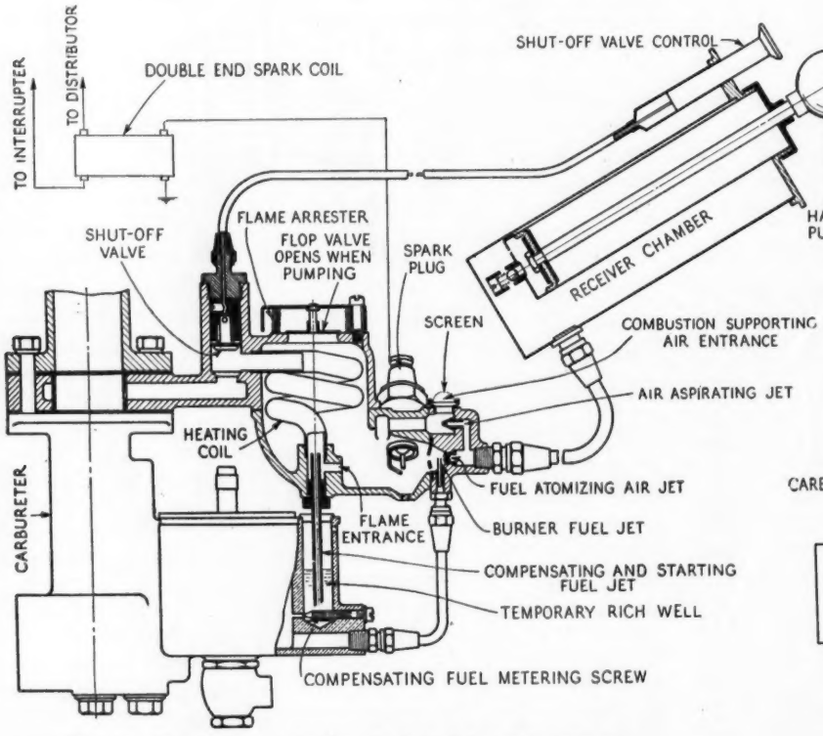


Fig. 3—Hand pump starter designed by John Good

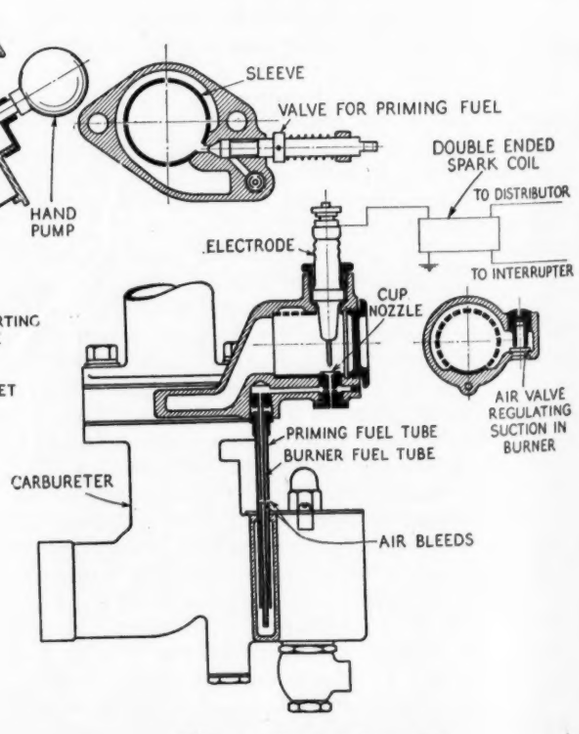


Fig. 4—Good prime-start

and air are drawn into the heater by the suction of the engine, and the heater continues to burn as long as the engine is running, no shut-off valve being provided. The rate of fuel consumption of the heater is 6-10 oz. per hour. The primer fuel tube and the burner fuel tube are arranged concentrically. There is an air bleed in the primer fuel tube, which has the effect of producing an emulsion of gasoline and air for priming, thereby helping lift the fuel to the burner and the manifold when the suction is low owing to slow cranking in cold weather, and of keeping the ratio of the mixture fed to the burner fairly constant throughout the range of inlet manifold suctions.

Packard Fuelizer

The Packard Fuelizer should be included among devices intended to facilitate starting, although it is working all the time the engine is running. In this device, which is combined with the carbureter, a variable proportion of the total amount of mixture formed in the carbureter is shunted around the throttle valve and burned in a chamber, with the heated wall of which the main portion of the combustible gas comes in contact on its way to the cylinders. Ignition of the diverted stream of combustible gas is assured by a spark plug screwed into the wall of the fuelizer, which is sparking continuously as long as the engine is running, and the gases of combustion from this chamber are mingled with the incoming charge before it enters the cylinders.

The proportion of the amount of gas passing through the fuelizer to the total varies with the throttle position, being greatest when the throttle is nearly closed. Immediately after the engine is started it is usually idled for a while, under which condition the heating effect of the fuelizer is a maximum, in which respect its action differs from that of the more common exhaust-heated inlet manifold or hot spot, which does not receive very much heat when the engine is idling.

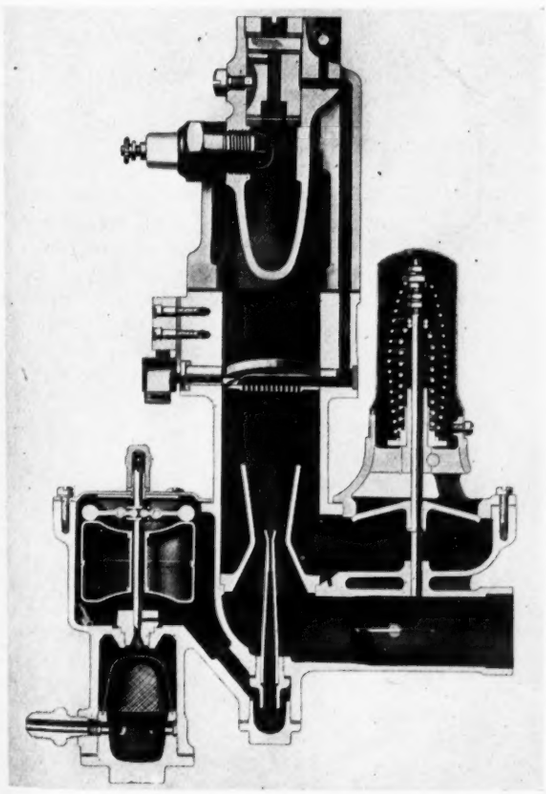


Fig. 5—Packard fuelizer

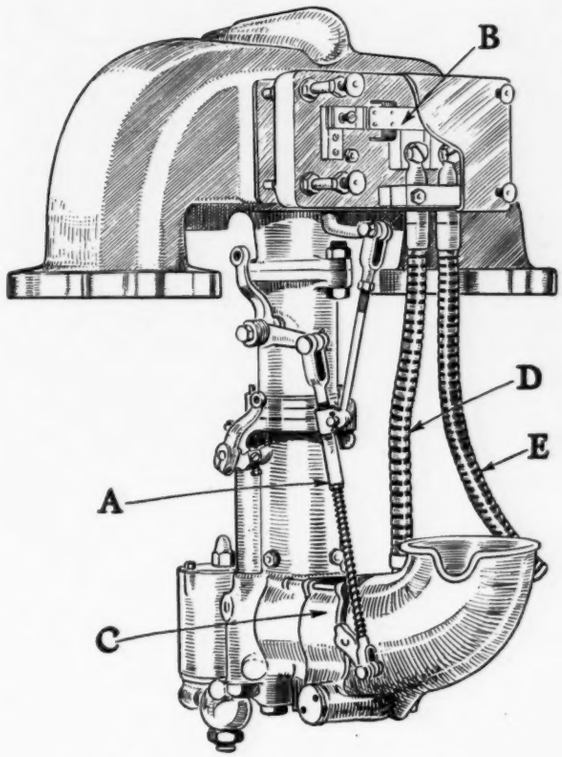


Fig. 6—Lincoln electro-fog generator

If electric heat is to be used for vaporizing the fuel during the starting period the question naturally arises: How much electrical energy is required? The storage battery carried on most cars is none too large for starting the engine, and if it has to supply current to a heater coil at the same time as to the starter, fears might arise that the drain on it would be inordinately severe or else that the current supplied to the starter would not be sufficient to give the necessary starting torque.

This question cannot be answered categorically. It was shown in the foregoing that by supplying about twenty times the amount of gasoline normally required, a stable mixture can be formed at about 30 deg. Fahr. If the temperature of the mixture is raised by means of an electric heating coil, then it is not necessary to feed such a large excess of gasoline, and the disadvantages of flooding the cylinders, such as waste of fuel and crankcase dilution, are reduced. For instance, if the mixture be heated to 150 deg. Fahr., then all of the components of the gasoline having a boiling point up to 300 deg. Fahr. would remain vaporized in a perfectly proportioned mixture. This includes from 60 to 70 per cent of the different grades of gasoline that are being marketed at the present time. To vaporize 90 per cent of the fuel and keep it vaporized in a theoretically correct mixture would require a mixture temperature of about 210 deg.

These figures are approximate only, as not only the grades of gasoline but the pressure in the manifold varies. However, the conditions affecting starting are somewhat more favorable than appears from the figures quoted, for the reason that a considerably leaner mixture than that of the chemical combining ratio is ignitable. In fact, the leanest gasoline-air mixture that can be ignited contains only about one-half as much fuel as a theoretically correct mixture, so it would seem that if the mixture could be heated to 150 deg. Fahr. by an electric heater or otherwise, it would be ignitable even if it contained no excess of gasoline. What is actually done in practice is to depend partly on enriching the mixture and partly on heating it.

At the present time two American stock cars are regularly fitted with electric heating units for vaporizing the fuel in cold weather, and several such units which can be fitted to existing cars without difficulty are being manufactured by specialty manufacturers.

The Lincoln car has a so-called electro-fog generator. This consists of an electric heating element in a receptacle at the bottom of the carbureter. Flow of current from the storage battery through this heating unit is controlled by means of a switch hooked up with the carbureter choke. The heater is said to generate a gasoline fog and to permit of readily starting the engine even in temperatures below zero Fahrenheit.

Referring to the drawing of the Lincoln carbureter and manifold herewith, secured to the side of the manifold is a switch box the cover of which is shown partly broken away. After the choke button has been pulled out about ¾ in. a spring stop *A* is encountered which increases the resistance to the motion of the button. The carbureter choke valve is then nearly closed. Further motion of the button brings the movable member of the heater switch in contact with a thermostatic member *B*. This thermostat is of the unlike metals type which becomes bent as it heats up and thereby breaks the circuit.

When the circuit is closed at the switch, current from the storage battery flows through the heating element, which is located in the receptacle *C* at the bottom of the carbureter. The heating element is grounded to the receptacle and is supplied with current from the switch through the cable *D*, while cable *E* connects from the switch to the battery.

The heating element is surrounded by an absorbent pad of non-combustible material, and when the engine is being cranked and fuel is drawn from the spray nozzle without being thoroughly atomized, it drains down the walls of the mixing chamber and collects in the receptacle. It requires about 15 seconds for the thermostat to reach a sufficient temperature to open the circuit. The first five seconds of this period is required to heat up the heating element itself and bring the fuel to the vaporizing point, and during the remainder of the time gasoline fog sufficient for several explosions is generated.

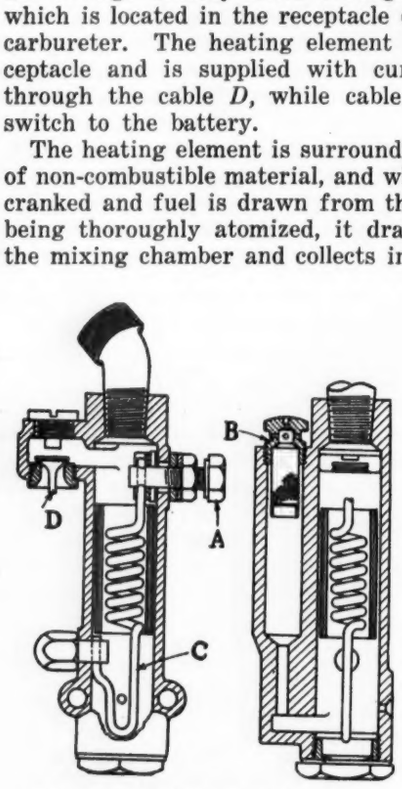


Fig. 7—Franklin electric primer

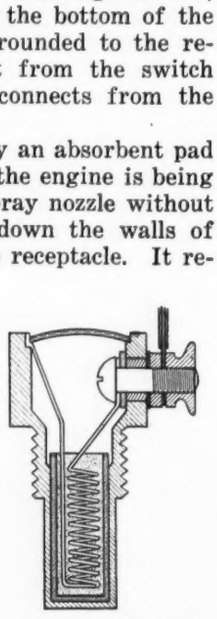


Fig. 8—Startit electric vaporizer

The other car in which an electric primer is used is the Franklin. Here the heating coil is placed in one leg of a U tube which communicates with the float chamber, so that the lower portion of the tube is at all times filled with gasoline. A small amount of air can enter through an orifice in the plug closing the other leg of the U tube and, in bubbling through the gasoline at the bottom of the tube, this air becomes saturated with vapors. From the top of the leg containing the heating element a tube leads to the inlet manifold, and communication between the primer and the inlet manifold is controlled by a solenoid-operated valve in this tube. In a side pocket to the leg containing the heating coil there is a small suction-operated poppet valve, through which additional air enters and mixes with the very rich mixture formed by the primer when the engine is turning over. The solenoid operating the valve placing the primer in communication with the inlet manifold is connected in series with the heating coil, whereby the operation of the primer is simplified and trouble from incorrect manipulation prevented.

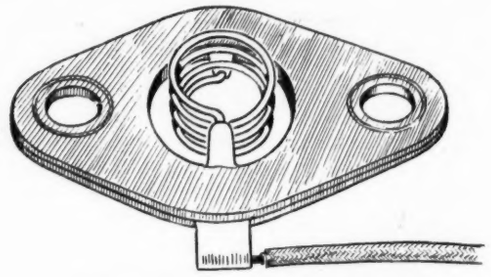


Fig. 9—Yale automatic Hot-Koil

The air which enters the primer through the primary inlet is compelled to pass through a wire gauze screen, the object of which is to prevent the ejection of gasoline in the form of a spray from the primer in the event of backfires in the carbureter, which naturally occur when starting in extremely cold weather.

It is claimed that by the use of this primer the engine can be started immediately in temperatures as low as 5 deg. below zero and that by allowing the current to flow for a short period before depressing the starting switch the engine can be started when the temperature is 20 deg. below zero.

In the following are given brief descriptions of several electric primers made by accessory firms.

Startit Electric Vaporizer

The Startit electric vaporizer, manufactured by the Startit Mfg. Co., Indianapolis, Ind., is in the form of a plug which is screwed into the wall of the inlet manifold, usually at the joint between the vertical and horizontal sections of the manifold. As may be seen from the accompanying drawing, a coil of electric heating wire inserted in a thimble of insulating material is located in the extension of the screw plug, the walls of which are of brass and only 0.01 in. thick. One end of the coil is grounded under the Welch disk which closes the screw plug at the outer end, while the other end is connected to a binding post.

It is claimed that with this device the gasoline will begin to vaporize in 12 seconds. It is recommended to allow the current to flow about 30 seconds ordinarily and up to 1 minute in extremely cold weather. This vaporizer is intended to be controlled by a separate switch.

The Yale Automatic Hot-Koil is manufactured by the John Lees Co. of Indianapolis. It is in the form of a short coil of nichrome wire which is supported by a gasket that is inserted between the carbureter and inlet manifold flanges, one end of the coil being welded to a piece of sheet brass through which it is grounded, while the other is welded to an insulated terminal. The insulated terminal connects to the ground terminal of the starting motor, so that the heating coil is connected in series with the starter and has current flowing through it just as long as the starting switch is closed. No separate switch is required

and the operation of the coil is entirely automatic. On the other hand, there must be a slight lag in the heating action after current is applied to the starting motor, as it takes some time to bring the coil up to the temperature necessary to vaporize gasoline.

The Pomeroy electric primer, manufactured by the Pomeroy Electric Co., Inc., of Rochester, N. Y., consists of a conical or volute coil of heating wire supported on a gasket inserted between the carbureter and the inlet manifold. It is controlled by a switch which is clamped to the steering column and therefore can be turned on and off independently of the starting switch. The primer is said to consume 10 amperes and is kept in circuit for 45 seconds.

Further progress in cold weather starting aids will no doubt depend somewhat on development in fuels. If fuel should become still less volatile the need for such devices will increase, and this will promote their development.

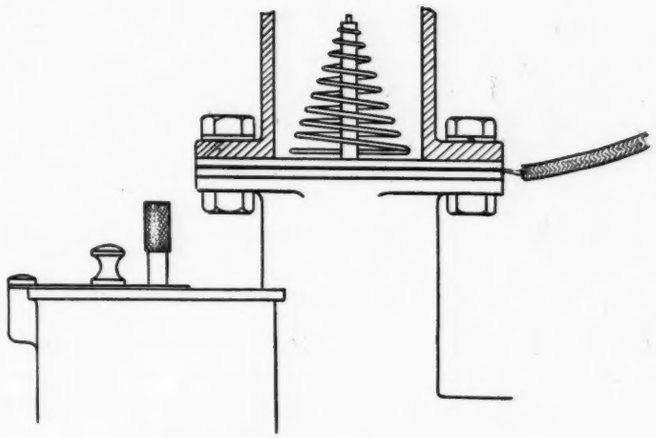


Fig. 10—Pomeroy electric primer

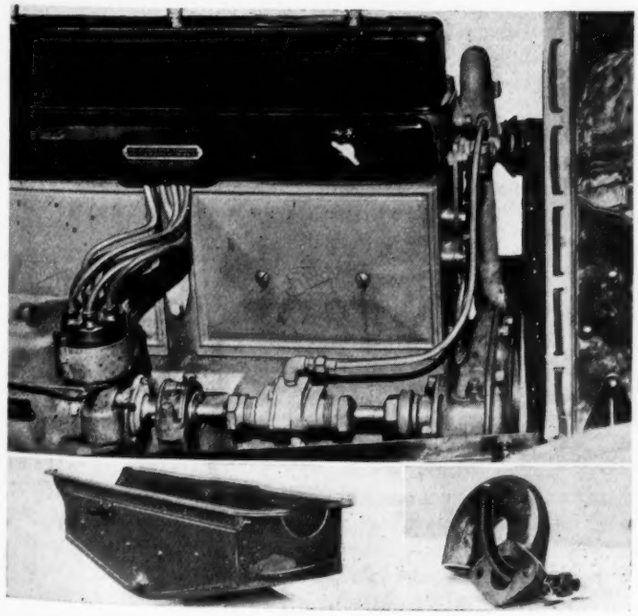
Rushmore Steam Cooling System Provides Hot Water Jacket for Oilpan

A FURTHER development of the Rushmore steam cooling system has been made the subject of patent applications and experimental development work conducted recently in the Rushmore Laboratory, Plainfield, N. J. It involves providing a hot water jacket for the oilpan of the crankcase, with a view to maintaining the oil at a temperature sufficient to evaporate all water and at least a considerable proportion of the fuel which becomes mixed with it.

It will be recalled that, in the Rushmore system, water and steam discharged from the cylinder jacket enter the bottom instead of the top of the radiator, as in the conventional water-cooling systems. In the bottom tank the water and steam separate, the steam rising into the radiator core, where it is condensed and returns by gravity to the lower tank, while the water, still at or near the boiling point, passes to the gear pump, which delivers it again into the cylinder jacket.

When it is desired to heat the crankcase, the water leaving the lower radiator tank, instead of passing direct to the pump, flows first through a jacket which covers the underpan and thence enters the pump and cylinder jacket. Experiments with this arrangement have been conducted, using a late model Buick car, parts of which are shown in the accompanying photograph. The jacket on the lower pan is formed by riveting and soldering three pieces of No. 18-gage brass sheet to the underpan. Hot water from the lower tank of the radiator flows to a single opening near the top of the left side of the oilpan jacket, crosses under the pan (through the jacket) and leaves the jacket at the right side just below the pump.

There is a minimum of piping, and this is all ¼-in. copper tubing. Heating over the entire pan jacket is said to be uniform, and the jacket, it is asserted, comes up to temperature in a very short time after the engine is started. Practically all the heat entering the cylinder jacket remains in the cooling system until boiling starts. Adding the underpan jacket has not, it is claimed, resulted in any lower oil pressure being registered by the oil gage. A small gear pump is used in this installation.



Rushmore steam cooling and pan warming system as applied to late model Buick. Note use of gear circulating pump and small size of water piping

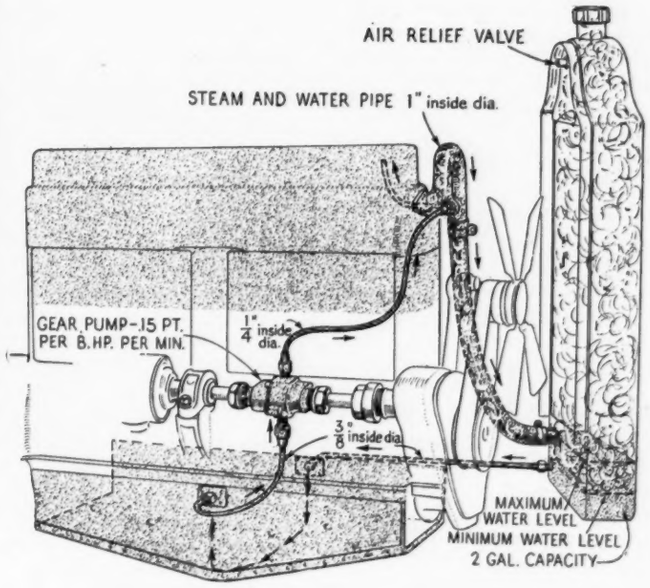

AIR RELIEF VALVE
STEAM AND WATER PIPE 1" inside dia.
GEAR PUMP-15 PT. PER B.HP. PER MIN.
1/4" inside dia.
3/8" inside dia.
MAXIMUM WATER LEVEL
MINIMUM WATER LEVEL
2 GAL. CAPACITY

Diagram of Rushmore system showing water in cylinder and oil pan jackets and steam in outlet pipe and radiator core. Arrows indicate direction of flow

What some of our readers have to say about piston scuffing and the properties and use of benzol as a motor fuel.

Editor, AUTOMOTIVE INDUSTRIES:

In the Nov. 6 issue of AUTOMOTIVE INDUSTRIES several questions were asked by Marshall Garlinger in regard to the use of benzol as a motor fuel. We have been marketing a benzolized motor fuel since March 11, 1911, under the trade name of "Bengas." This fuel is a fifty-fifty mixture of benzol and gasoline.

1. It has been our experience with benzolized motor fuel to have less carbon deposit in motors than when gasoline was used.

2. We have noticed no difficulty in piston or cylinder wear due to the use of benzol.

3. No noticeable effect upon valves.

4. According to the analysis made by our own laboratory there was less crankcase dilution when benzol was used than when gasoline was used. The results of our tests were also substantiated by similar tests made by a chemical concern having a research laboratory second to none in the world.

5. It is the consensus of opinion of all operators of motor vehicles using benzolized fuel that it affords easier starting of a cold engine than does gasoline.

6. Operators also notice an increase in power which is attributed to the slower rate of flame propagation.

7. We have noticed no tendency for motors to overheat. In fact, we have conducted severe road tests during the hottest summer weather and could notice no increased heating.

8. From experience with a fleet of over 150 vehicles we obtain better than 20 per cent increased mileage per gallon. Therefore, if the price of a benzolized fuel is not more than 20 per cent above the price of gasoline there would be an economy. It has been our experience, however, that people who buy a motor fuel on its merits will readily pay 5 cents more per gallon for a benzolized motor fuel than for straight gasoline.

V. A. MILLER,
Manager, Fuel Department,
Rochester Gas and Electric Corporation.

Editor, AUTOMOTIVE INDUSTRIES:

With reference to the article regarding the properties of benzol appearing in the Forum on Nov. 6, the following may be of interest:

For several years a six-cylinder car was operated with pure benzol during the summer months and with various mixtures of gasoline during the winter months (to prevent freezing of fuel). The carbon deposit was no more bothersome when using benzol under these conditions than with gasoline, the nature of the deposit with benzol permitted its easy removal.

Benzol used as fuel in this car gave a smooth "knockless" performance, far superior to gasoline and due to the characteristics of the fuel, the carbon could be allowed to accumulate much longer without noticeable effect.

As you have noted in your reply to Mr. Garlinger's inquiry, there was less trouble with crankcase oil dilution when using benzol; in fact, none was evident except when over 50 per cent gasoline was used.

During operation of the car with benzol the power of the engine seemed to be greater, but it is believed that this was due more to the elimination of "knocking" than to any appreciable increase in b.hp.

The fuel was slightly alkaline, indicating that any acid content had been neutralized, but it had a blackening effect on the interior of the carbureter, indicating the presence of a small amount of sulphur. While an analysis of the fuel was not made, it was believed to be the normal product in commercial use at the time.

I am adding the following bibliography which may be of interest to anyone interested in a further discussion of the use of benzol:

Benzol Specifications and Remarks. Commercial Motor (England), Feb. 20, 1919.

German Army Tests on 1914 Model Mercedes. Gasoline gave superior speed, but fuel consumption was 3.8 miles per litre with benzol and 3.6 miles per litre using gasoline alone.

Analysis and Valuation of Motor Fuels (from German data) reported in *The Automobile* July 29 and Aug. 5, 1915.

AUTOMOTIVE INDUSTRIES. E. B. Neil. Nov. 12, 1924.

Von Loew's tests. *The Automobile*, Oct. 14, 1915.

E. B. NEIL.

Advocates Greater Piston Clearances

Editor, AUTOMOTIVE INDUSTRIES:

Valuable comments continue to appear in your columns on Frank Jardine's explanation of scuffed pistons.

Our own experience bears out to some extent the ideas set forth by C. C. Thomas in your Oct. 16th issue. We believe that the industry is making too great attempts to cut down piston clearance and that, as long as this effort is maintained with the present alloys used and in connection with the split skirt principle of piston design, the most desirable results cannot be obtained.

When the metal expansion is greater than the clearance allowed, the compensation takes place in the slot through wall pressure. The high pressure areas squeeze out the lubricating film, causing metal-to-metal contact. It is this exceptionally small clearance allowance that we be-

lieve is unnecessary for even the best sort of performance.

If it is deemed necessary in order to stave off eventual piston slap due to excessive cylinder wall wear, would it not be logical to improve our present cylinder blocks by more complete aging?

We always have manufactured the full or solid skirt piston from our own alloy, which has proved to have good bearing qualities, and can be operated at very reasonable clearances. We never have been confronted with the necessity of mechanically providing for less clearance, and have not experienced undue cases of scuffing except where the motor may have been deprived of all lubrication or water, or some accident which very likely would have damaged anything that could have been put in.

Our solid skirt pistons have attained as high as 175,000 miles in bus service and were still perfectly suited for additional miles in another block of the same dimensions as the previous one. It is because of this experience that we feel that the industry's effort is misdirected in trying to maintain these exceptionally close clearances. We never have experienced any piston trouble such as scratches or scoring from cold cylinders.

We believe that scuffing is due largely to close clearances easily affected by abnormal conditions in the engine, and secondly, that more perfect aging of cylinder blocks will make unnecessary these close fits.

NEWTON J. BUREN,
General Manager, Tsungani Piston Co.

Properties of Benzol

Editor, AUTOMOTIVE INDUSTRIES:

In response to your request for additional light on the use of benzol, in your issue of Nov. 6, I wish to give my experience with this fuel, which may be of interest to you. I used benzol very extensively in England, from 1906 to 1914, in several automobiles which I owned and drove during that period.

Briefly, the characteristics of benzol which are apparent to the user of this fuel in automobiles may be summarized as follows:

1. Carbon deposits due to the combustion of the fuel are flocculent and easily removable, and occur only when an excess of fuel is present in the mixture. It must be remembered that the explosive range is much smaller with benzol than with gasoline, and if proper care is taken to prevent rich mixtures there should be no deposits.

2. No undue wear of cylinders and pistons can be attributed to benzol, according to my experience.

3. A slight deposit of sulphur compounds is found on the valves. This is in the form of a yellow powder, and my experience does not show the presence of acids formed as a result of the small sulphur content in commercial benzol.

4. During the period of my investigation, crankcase dilution was not a problem, and no attention was given to it. Your editorial note, however, is fully indorsed by me, with regard to the reasons why dilution should not take place. Reiterating your remarks, the temperature of the distillation curve of benzol up to 90 per cent is so much in its favor that it is almost inconceivable that there should be dilution of crankcase oil when using this liquid.

5. Starting difficulty has not been experienced in my work at ordinary temperatures, but it is quite conceivable that in very cold weather there would be difficulty in this respect, on account of the low vapor pressure of benzol. This can easily be taken care of by small injections of light gasoline when starting cold.

6. Effect on power is probably more psychological than actual, because in using benzol the detonation generally apparent to a certain extent when pulling hard at low speeds with gasoline, does not exist, so that the throttle can be opened fully at all times and full response of the engine obtained. Actually, there should be no real difference under laboratory conditions between the use of the two fuels, everything else being the same.

7. Tendency to overheat does not exist, except under conditions of faulty carburetion.

8. About 12 per cent more miles per gallon are obtained with benzol under otherwise similar conditions of operation. This has been confirmed by me many times with different machines and seems to be an average figure.

Care must be taken to have a reasonably correct carbureter adjustment, and in this connection due thought must be given to the difference in the viscosity of benzol and gasoline. There is a slight smell from the exhaust, due to the presence of sulphur compounds in the benzol; if the latter is not properly washed this smell may be very unpleasant.

Care should be taken that the liquid is not spilled, as it removes varnish from the parts with which it comes in contact. Deposits on the cylinder head and on the piston do not cause any trouble, but I have found that occasional treatment with a mixture of kerosene and alcohol of equal proportions allowed to stand over night in hot cylinders is quite effective.

ROBERT W. A. BREWER, President,
Engineers Development Company.

Effect of Benzol on Power

Editor, AUTOMOTIVE INDUSTRIES:

Regarding Mr. Garlinger's comments on the use of benzol as a fuel in automotive engines, some of the results normally obtained by the use of benzol-gasoline mixtures as aviation engine fuel might be of interest.

Placing conclusions first and the reasons for them afterwards. The power output of an engine may be increased and the tendency to overheat decreased by the use of benzol as fuel, provided the benzol mixture prevents detonating combustion. The fuel economy may be increased if the distribution is improved sufficiently to allow a leaner carbureter setting.

The effect of benzol on the power output of an engine depends principally on the type of combustion being obtained with the standard fuel at a given compression ratio. An engine with a compression ratio of 5.5:1, which is considered "low compression" for an aviation engine, operated on commercial "low test" gasoline would detonate severely at full throttle.

If benzol in small quantities were added to this fuel, the detonation would become less severe with a resulting increase in power and as the benzol content was increased, the detonation would continue to diminish and the power increased until combustion entirely free from detonation was obtained, after which an increase in the benzol content would have no effect on the power output. This same relationship holds for aviation gasoline-benzol mixtures as used with higher compression ratios.

The indications of an "overheated" engine are, ordinarily, loss of power and excessive cooling water temperatures. It can be very conclusively demonstrated that a small amount of detonation causes an engine to "overheat" rapidly.

If an over-compressed or a supercharged engine is operated at ground level or at low altitudes at excessive manifold pressures, detonating combustion is the result, and the temperature of the water leaving the engine will immediately increase, and if the detonation continues

the water will reach the boiling point in a very few minutes.

The manifold pressures on these types of engine may be varied in flight by the use of special controls. If the cause of a particular engine "overheating" is detonating combustion, the use of benzol in sufficient quantities to prevent detonation will also eliminate overheating.

Referring to economy of fuel rather than of dollars, dynamometer tests have shown that, with a fixed carbureter setting, the specific fuel consumption, pound per brake horsepower-hour, with a 50-50 aviation gasoline-benzol mixture was higher than with straight aviation-gasoline in the approximate ratios of the specific gravities of the fuel mixture and fuel as used. This means that on a volume basis the consumption was the same.

As pointed out by the editor in connection with oil dilution, the boiling temperatures of benzol over 90 per cent of the distillation range are much less than those of ordinary gasoline over the same range. This simply indicates that a benzol-gasoline mixture is more volatile than gasoline alone, so that at a given manifold temperature there will be less liquid fuel on the manifold walls when using the benzol mixture.

Less liquid fuel in the manifold will improve the distribution, so that a leaner carbureter setting may be used and still provide the individual cylinders with the same quality of mixture. Increase in economy by the use of benzol, particularly at part load, is therefore dependent on the improvement in distribution obtainable. If an excessive rich mixture has been used to minimize detonation at full throttle, benzol mixtures by eliminating detonation eliminate the necessity for the rich mixture and thus improve economy.

J. Mackenzie Miller,
Research Engineer,
Engineering Division, Air Service,
McCook Field, Dayton, Ohio.

Books on Management, Eye Hazards and Business Forecasting

THE automotive industry is given a place at the head of the standardization movement in *Management's Handbook*, recently published by the Ronald Press Co., 20 Vesey Street, New York City. The history of standardization work in the automotive field is placed first in the section devoted to Standardization in Industries, which is one of thousands of sections providing an almost unbelievable amount of detailed fact material in this new 1607-page reference work.

The book is similar in physical make-up and general purpose to the engineering and mechanical handbooks which have been so well known for many years. It is designed to do for the executive confronted with management problems what the engineering handbooks do for the technical man working in the mechanical field. It is the sort of thing that nearly anybody having to do with any phase of management is certain to refer to frequently he has it within arm's length. It would be easier almost to tell what topics are not covered by the data in this book than to attempt to list those that are. The price is $7.50.

IT is evident that the writer of the preface to "The Problem of Business Forecasting" is an optimist, for he says to begin with that "Human conduct is based largely on forecast, and forecasts are based largely upon statistics." Probably there would be less money lost by manufacturing organizations if the statement were true. In our experience, however, we have known only a few humans whose conduct actually was based on forecast and fewer still who operated on forecasts the foundation of which was statistics.

Nevertheless this volume does make a definite contribution to the cause of getting more planning into business operations. It is based on papers presented at the eighty-fifth annual meeting of the American Statistical Association and covers a wide range of practical forecasting methods for use in modern business. The topics range from general ones such as the discussion of the general business forecasting problem by W. M. Parsons of Harvard University to illustrations of specific cases such as contained in the chapter written by C. O. Hardy of the Institute of Economics.

The chapter by Raymond B. Prescott on "Forecasting Automobile Production" will be of special interest to automobile executives. Mr. Prescott outlines the methods used in fitting the Gompertz curve to automobile production and shows the degree of success achieved by forecasting in this way. He goes on to present data concerning fluctuations in production due purely to economic trends with the seasonal factor removed, and indicates the need for more detailed statistical work in predicting automotive progress.

A BOOKLET on "Eye Hazards in Industrial Occupations," by Louis Resnick and Lewis H. Carris, has been published by the National Committee for the Prevention of Blindness, Inc., of 130 East Twenty-second Street, New York. Price $1.50. It is of special interest to safety engineers and inspectors and to industrial physicians and nurses.

International Standardization of Bolts and Nuts Considered

A STEP toward international standardization of bolts and nuts was taken in a meeting held recently in New York and attended by representatives of the American, Czechoslovakian and German national standardizing bodies. Most of the discussion related to nut and bolt head sizes. It appears that in Europe there is a strong tendency to make both bolt heads and nuts the same size across flats, while the prevailing American practice is to make the bolt head 1/16 in. smaller than the nut.

It developed that Austria, Germany, Holland, Sweden and Switzerland have adopted national standards for bolt and nut diameter and corresponding wrench openings and that similar action is contemplated by Czechoslovakia, Hungary, Poland, Norway and Russia. Standards adopted were supposed to follow American practice but actually followed the so-called "United States Standard" as given in various handbooks which, it was stated, represents less than 3 per cent of American production.

It was agreed that world wide uniformity in wrench openings is so important that it would be desirable to discuss the matter at an international conference in the near future, and that each group represented should take up the matter of such conference with its own national standardizing body.

According to those who attended the meeting, American bolt and nut makers use steel with a manganese content up to 0.60 per cent and phosphorus not exceeding 0.10 per cent, while the Germans use a steel free from manganese but containing up to 0.40 per cent phosphorus.

Stainless, Non-Corrosive Alloy Steels Meet Exacting Chassis and Body Requirements

They resist corrosion under conditions of high temperature, exposure to gases and severe weather. Mechanical properties not greatly lowered by heat.

MANUFACTURERS of steel products that in service are subjected to the corroding influences of the weather, of high temperatures and of gases that may react to an acid test naturally are interested in iron and steel alloy that are non-corrosive, or practically so. Alloys of iron and chromium which have this property have come into extensive use in recent years, not so much, perhaps, in automobile construction as in other lines. In automobiles these non-corrosive ferrous alloys have been used for radiators, hub caps, body trim, spark plug shells, primer coils, windshield frames, pump shafts and lamps.

A booklet on Non-Corrosive and Heat-Resisting Steels has been issued recently by the Crucible Steel Co. of America, in which the various steels of this type manufactured by the company named are described and the subject is discussed in a general way.

There is one group of iron-chromium alloys that can be hardened in the same way as ordinary carbon and other alloy steels. This group includes, primarily, stainless iron and stainless steel, the former representing alloys with from 9 to 16 per cent of chromium and up to 0.12 per cent carbon, while the latter includes alloys with the same chromium content and generally about 0.30 per cent carbon. Stainless steel with more than 0.15 per cent carbon has considerable air-hardening properties and, therefore, is rather sensitive in manufacture. In order to be entirely satisfactory stainless steel must be hardened and polished.

It is not necessary to heat-treat stainless iron, although it responds very nicely to both hardening and drawing operations, in spite of its low carbon content, and its physical properties can be materially improved by this treatment.

Non-hardening, Non-corrosive Alloys

The second group of non-corrosive alloys consists of chrome nickel steel with high contents of both chromium and nickel and sometimes other alloys to produce particular results. One alloy falling under this heading is known as Rezistal and is characterized by a high silicon content. Another steel of this class is Atha's No. 2600. This latter steel really belongs to the Rezistal group, but, having been developed in the Atha Works of the Crucible Steel Company of America, it was given a special designation. When Atha No. 2600 steel is quenched it softens and becomes toughened.

The true elastic limit of Atha No. 2600 is quite low, and it is lowered by quenching. The only way of increasing the elastic limit of this steel consists in cold working it (cold rolling or cold drawing). The proportional elastic limit, however, is said to be equal to or better than that of machinery steel, and it has excellent elongation and reduction of area. Tests recently made by the Naval Experiment Station are said to have shown that Atha's No. 2600 has a higher endurance limit than its true elastic limit. In this respect the No. 2600 is similar to 12 per cent manganese steel, which is largely used in crushing machinery and in other machines where it is subjected to severe usage, which seems to warrant the conclusion that a low true elastic limit is no particular detriment.

While the high nickel-chrome-silicon alloys have no very high tensile properties, they retain their tensile properties remarkably well at high temperatures. A recent test on the No. 2600 is said to have shown a yield point of 80,000 lb. per sq. in. at 1000 deg. Fahr. Fatigue, torsion and tensile tests made at the same temperature showed considerably better values than are obtained with ordinary alloy and even with high-speed steels. For one of the Rezistals it is claimed that it will resist serious scaling at a temperature as high as 2200 deg. Fahr.

Properties of Rezistal

In the Rezistal alloys the carbon content between the limits of 0.20 and 0.60 per cent is not an important factor in determining the tensile properties. The properties of the alloy in the untreated state depend upon the content of alloying elements and upon the finishing temperature. The speed and the amount of the final reduction (under the hammer or in the rolls) also affect these properties. Generally the highest elastic and tensile values are found in the alloy as rolled or in the natural condition. These properties range about as follows:

Yield point	80,000-110,000 lb. per sq. in.
Tensile strength	100,000-150,000 lb. per sq. in.
Elongation in 2 in.	35-20 per cent
Reduction in area	50-30 per cent
Brinell hardness	225-300

The specific gravity of Rezistal steels is from 10 to 12 per cent less than that of copper, nickel or cupro-nickel alloys.

Any subsequent annealing, normalizing or quenching reduces the yield point, tensive strength and Brinell hardness, while greatly increasing the ductility and shock resistance. Rezistal alloys are tough even in the natural condition (18-30 ft. lb.). In this respect they differ sharply from the high chrome steels (17-30 Cr.) which display extreme shock brittleness in almost every condition (1/3 ft. lb.). Rezistal steels cannot be hardened by any kind of quenching, but they are readily softened by quenching, improving the machining and cold-forming qualities. They may be greatly hardened by cold-rolling and cold-drawing, which simultaneously greatly increases the tensile strength and yield point.

Strength Maintained at High Temperatures

While Rezistal steels are not as strong at ordinary temperatures as many of the structural alloys, they have the property of "holding on" very much better at elevated temperatures than other steels, not excepting high-speed steel. For example, a steel of 20 per cent nickel and 12 per cent chrome broke at 34,100 lb. at 1650 deg. Fahr., thus showing nearly double the strength of high-speed steel and stainless steel at the same temperature and three to four times the strength of several other alloys not containing nickel.

Other tests of Rezistal at high temperatures show:

Deg. F.	Tensile Strength, lb. per sq. in.	Elongation, per cent	Reduction, per cent
700	85,700	28.5	39.6
700	88,200	31.0	42.8
1000	100,300	24.0	30.0
1292	71,470	20.0	24.7
1472	44,900	28.5	62.8
1760	21,395	37.5	82.4

Steels of the Rezistal type have been studied by H. F. Moore, Dr. D. J. McAdam, Jr., and others. Their endurance limits for ten million cycles in the rotating cantilever machine seem to be close to one-half the tensile strength or, say, 50,000 to 65,000 lb. Furthermore, they seem to maintain this property at high temperatures in about the same proportion that they retain their strength relative to all other materials.

While stainless steel usually contains between 9 and 16 per cent of chromium (with 0.30 per cent of carbon), its special qualities are most pronounced with from 12 to 14 per cent of chromium. To develop its best stainless qualities it must be hardened from a temperature sufficiently high to cause virtually a complete solution of the carbides. This temperature is usually from 1750 to 1850 deg. Fahr. Once perfectly hardened, it does not lose its stainless qualities by drawing the temper to 900 to 950 deg. Fahr.

Stainless steel will show from 225,000 to 250,000 lb. per sq. in. tensile strength upon hardening at 1800 deg. Fahr., and it retains its strength up to drawing temperatures of 950 deg. Fahr., at which degree of tempering it will show 7 to 9 per cent elongation and 20 to 25 per cent of reduction of area.

Another Lacquer Manufacturer Enters Automotive Field

A FURTHER addition to the growing list of pyroxylin lacquer finishes for automotive use is that of a product termed Nik-O-Lac, manufactured by G. K. Nikolas & Co., 1227 Van Buren Street, Chicago. This product, which is employed by the Yellow Coach Mfg. Co. in finishing bus bodies, includes both base and final coats, all of which are nitro-cellulose products, whereas with most other lacquer finishes undercoats of the varnish base variety are used.

One ingredient of Nik-O-Lac which is said to be important in producing the quality of the finish desired is Zanzibar gum, a fossil gum used also in varnish manufacture.

As with other finishes, it is necessary to have the surface to be finished absolutely free from grease, rust and other foreign material. The first finishing operation consists of glazing with a putty knife. Within an hour the glazed surface is sanded with No. 240 paper, care being used not to sand the glaze out of file marks, but simply to secure a smooth surface.

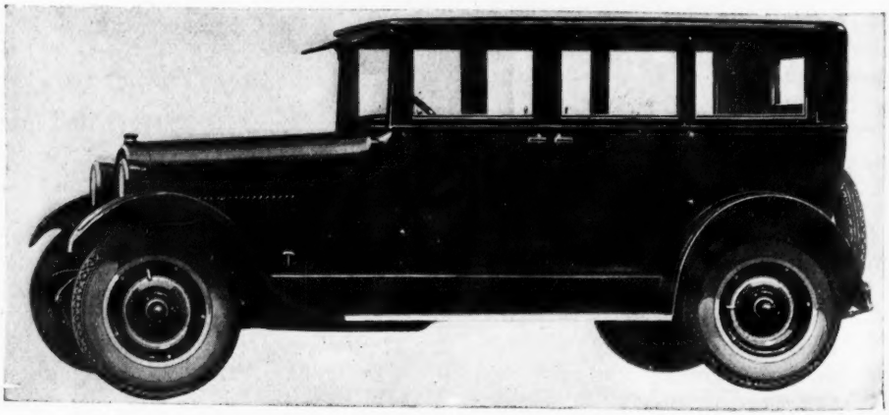
Primer next is applied, joints at moldings being coated first with a ¼-in. Fitch brush, after which the entire body is given a spray coat of primer. The brush is used to avoid the excess coating thickness which, it is asserted, is apt to produce chipping if attempts are made to use a spray coating at joints. The primer is allowed to air dry from 30 to 45 min., after which two to four coats of Nik-O-Lac filler are applied at half-hour intervals, the number of coats depending upon the condition of the metal and the thickness of the individual coats.

These coats are allowed to dry over night, after which they are wet sanded with No. 280 Wet-or-Dry paper. When all moisture has evaporated, two to three coats of Nik-O-Lac color enamel are sprayed on and these coats are followed by one coat of clear finishing lacquer, if the finish is not to be rubbed, or three coats of same if rubbing is to be done. These coats can be applied at half-hour intervals and then are allowed to dry over night, after which they are rubbed with 4F pumice and water or No. 320 sandpaper and water.

Rubbing is continued until all orange peel effect is eliminated, and then, if a gloss is desired, polishing is done with rottenstone and water. Increased gloss is obtainable by using an ordinary polish.

In the foregoing operations three parts of primer are mixed with one of thinner, while filler is used in the proportion of two parts to one of thinner. Color and clear lacquer are mixed in the ratio of three parts to two of thinner, except in the final coat in which equal parts are employed.

A REPORT has been completed by the Bureau of Standards which covers the first phase of the investigation of quenching media for heat treatment. It relates to "quenching diagrams" for carbon steels, in which are shown the relations between Rockwell hardness, microstructure, thermal transformations and the cooling velocity at 720 deg. C. A discussion is given of the general relations between these quenching diagrams and various coolants, such as water at different temperatures, oils, sulphuric acid solutions of various concentrations, brines and sodium hydroxide solutions. The report was released for publication and will be presented in Boston, Mass., during the annual meeting of the American Society for Steel Treating.



The new Reo sedan which sells for $1,595, *the same price as the sport touring. It is equipped with balloon tires*

EDITORIAL

Play the Game!

THE election has been interpreted to mean, among other things, that the more radical elements in this country have received a severe setback. Doubtless this is true. There is a tendency in some quarters, however, to carry the interpretation further and urge that employers now are in a better position to "show labor where it gets off."

Manufacturers who have been conducting their industrial relationships along permanently established and socially just lines undoubtedly will continue in the same course without interruption. Elections or business changes will have no effect one way or the other on the principles applied in their handling of labor problems.

That is as it should be. Any attempt to capitalize temporary advantages to the detriment of the workers can result only in future trouble and wasteful friction in the long run. Men are human regardless of what political party is in power. The rules of fair play do not change with postmasters.

When Is a Car Too Cheap?

A PRODUCT which is too cheap to give reasonable service isn't worth much to anybody. On the other hand, sales of a product which is cheap but still gives reasonable service increase almost automatically as the price is reduced.

Buyers of low-priced cars usually expect and receive a less durable product than those who buy higher priced vehicles, but, of course, there is a point in the cheapening process below which it is not safe to go, since serviceability is sacrificed. Some observers believe this point has been reached if not passed in the case of some units on cars now marketed.

In support of this contention they point to electrical equipment which in their view is inadequate in size and carelessly assembled; to parts which are indifferently made and poorly fitted; to headlamps with insecure doors and parts of such light gage metal that correct adjustment of bulb in reference to reflector cannot be maintained; to absence of such important items, from the convenience standpoint, as water drain cocks; to so-called "emergency" brakes, which virtually are useless in performing the function for which they are intended and to numerous other items of a similar character.

Far be it from us to attempt to draw a limiting line in any case. Each manufacturer must be his own judge in matters of this kind. It must not be forgotten, however, that the American public is becoming better educated every year in respect to items which make or mar the utility and convenience of passenger cars, so that makers must be more careful than ever not to overstep such limits as there are in the degree of serviceability given. A year or two of serious weakness in any one of several respects has been enough to ruin the reputation and business of more than one car manufacturer.

We sometimes wonder if a maker who has approached the allowable limit in cheap construction wouldn't do well to figure how much more dependability, serviceability and convenience he could add to his product for say $10 or $20 (with the probability of having to increase the price accordingly), rather than to seek means whereby the cost could be cut a similar amount.

Standards for Cylindrical Fits

ONE of the most important items of machine design that has occupied the attention of standardization committees is that of the tolerances for parts with cylindrical surfaces that are to fit together. There are two major questions involved, on both of which opinion has been largely divided.

When a shaft or cylindrical plug is to fit into a hole, the shaft must be either smaller or larger than the hole, according to the class of fit desired—smaller for a running fit, for instance, and larger for a press fit. The difference between the two diameters is generally of the order of a few thousandths of an inch, and, therefore, if one of the parts is given a nominal diameter expressed by a round figure, the nominal diameter of the other will have to be expressed by a three or four point decimal.

The question therefore arose whether the nominal diameter of the shaft or the nominal diameter of the hole should be the round figure, or the basic diameter. Of course, the actual diameter of any one part will vary from the nominal diameter by amounts limited by the tolerance. There is something to be said for both systems, and concerns which have become accustomed to one of them naturally have favored its adoption. The wide use of standard reamers favors the adoption of the basic hole, while the use of cold rolled shafting in machine construction makes the use of the basic shaft desirable.

The other question that has arisen in this connection is whether tolerances shall be unilateral or bilateral. With unilateral tolerances the nominal diameter is the limiting diameter in one direction, the limiting diameter in the other direction being fixed by the tolerance. With bilateral tolerances the diameter is allowed to vary by slight amounts—the tolerances —to both sides of nominal dimension.

While it has been impossible in the past to secure complete agreement on these questions, the weight of opinion at the present time seems to favor the basic hole and unilateral tolerances.

Our Industry Today—

Low Production Period Entered With Plant Inventory at a Minimum, With Increase Not Likely Until First of Year

NEW YORK, Nov. 24—Plant inventories are small as automobile manufacturers swing into the lowest production weeks of the year and will not be augmented until there is a perceptible movement forward in car production. This is not likely to take place until the first of the year, although there may be instances of individual factories increasing their schedules before then.

Two factors have entered into the inventory situation. Due to adequate transportation facilities, manufacturers have experienced little delay in getting parts and materials entering into the production of cars at thirty days' notice and there has always been the chance of declining prices. The cost of materials took a sharp drop from March through July, mounted during the two succeeding months, but in October fell 2 per cent from the September point and 7 per cent from that of the previous October. Car producers, moreover, have sought to escape the difficulties that beset them several years ago when a letdown in production and sales found them with large and costly inventories on hand.

Parts Makers Prepared

The maintenance of low inventories has kept parts makers operating at the pace set by car manufacturers, although they have held their organizations in such shape that a stepping up in production could take place promptly upon the quickening of demand. After the first of the year parts production will show a marked upward trend.

Automobile output this month may reach the 270,000 figure. If it does it will indicate high production on the part of individual companies rather than any movement forward by the industry as a whole. Some producers in November will curtail output to rearrange plant facilities for greater production after the first of the year, but most manufacturers will delay factory overhauling until December.

Retail Sales Chief Factor

Conditions throughout the country are good, but they are not exceptional to the point of justifying increased manufacturing programs. Demand is satisfactory, but not showing any strong advance, and retail sales continue to be the dominating factor in manufacturing operations.

There is still no sign that producers are preparing to accumulate stocks for demand next spring. Manufacturers have virtually no completed cars in stock and retailers are maintaining only such stocks as are needed to meet current demand. This points to high operations at the beginning of next year with the likelihood of new production marks being reached during the first quarter months at least.

Parts Manufacturers See Prosperous 1925

M. & A. M. A. Directors Predict Steady Increase in Business After Turn of Year

NEW YORK, Nov. 26—Although the full force of improvement will not be felt until after the first of the year, favorable turn in the automotive industry has already been noted, following the election, according to opinions expressed by directors of the Motor and Accessory Manufacturers Association, who met here this week.

There was comment to the effect that the security markets, which usually discount future events, had shown feverish activity since the election, but that business interests would endeavor to avoid boom periods, with their unwholesome after-effects, and make the increase steady and substantial.

In automobile sales this is usually the dull period of the year. Therefore, it could not be expected that the industry would feel immediately any extensive effects of the improved business sentiment. It was the general opinion of the meeting that, with general prosperity on the gain, a brisk demand for motor vehicles would be felt in the spring. This means an increased parts and accessory business from now until that time to take care of increased production schedules in the motor car factories.

Comment was made on public statements to the effect that the industry was preparing for a 5,000,000-car year in 1925. It was felt that the public should not be allowed to expect any such expansion, but should be informed that production would be held to actual demand.

In an informal discussion of conditions in the industry satisfaction was expressed over the bright outlook in the tire division, predicated on the fact that this branch of the industry was on a basis which had never been sounder in its history. It was the feeling that the automotive industry generally would continue the stabilizing process already begun, which would include the enlargement of some of the better organized companies and the elimination of some of the smaller units.

Like the general condition in manufacturing and merchandise circles throughout the country, it was pointed out that materials and parts stocks of motor vehicle manufacturers were low, and considerable expansion of parts buying was not only justified but immediately necessary.

The sentiment regarding future activities favored conservative planning, but ultra-conservatism was held unjustified in view of the condition throughout the country of stocks, employment and wholesale and retail demand. It was the general opinion that cooperation among related industries, particularly in the automotive field, would assure a larger and more satisfactory year in 1925.

Sheet Mill Advances Price to 4.75c. Basis

PITTSBURGH, Nov. 24—The American Sheet & Tin Plate Co. opens its books for the first quarter of 1925 Tuesday morning. An advance of $3 a ton is made on automobile sheets to 4.75c. The company at the same time made an increase of $2 a ton in common black sheets and $3 a ton on galvanized.

The buying of automobile sheets here has been extremely heavy during the past week, as many automotive interests bought to get "the wire" at the old price of 4.60c.

The heavy bookings will make it impossible to make all shipments over the balance of this year and some will have to be carried over to the first part of the first quarter.

Ford High Dam Plant to Be Ready March 1

ST. PAUL, Nov. 27—Operations in the new $10,000,000 Ford plant at High Dam will be started about March 1, according to W. B. Mayo, chief engineer of the Ford Motor Co., and manufacturing will be under way by July 1. The assembly division will be the first part of the factory to be opened. Installation of machinery will begin in January.

At the outset about 1600 men will be employed, this number to be augmented by 1000 by the first of July. Manufacturing activities will be gradually expanded.

GORDON GETS HILL WORKS

INDIANAPOLIS, Nov. 26—Judge Mahlon E. Bash has approved the sale of the Hill Pump Works of the Midwest Engine Corp. to Huntile Gordon, pump manufacturer, representing Boston interests, for $215,000.

Body Producers Form $12,300,000 Combine

Murray Body Corp. Is Incorporated to Take Over Wilson, Widman and Towson Companies

DETROIT, Nov. 26—Formal announcement of the formation of the Murray Body Corp., to take over the assets of and combine the C. R. Wilson Body Co., J. C. Widman Co. and Towson Body Co., shows the new corporation will have a capitalization of $12,300,000, of which $4,000,000 will be in first mortgage 7 per cent sinking fund gold bonds due Nov. 15, 1934, $2,500,000 in 8 per cent cumulative preferred stock, $100 par value, and $5,800,000 common of no par value. The common stock represents 145,000 shares, stated value $40.

The officers of the company, as shown in the incorporation papers, are Allen Sheldon, president; Duncan J. McNabb, James R. Murray and Thomas M. Lewis, vice-president; Jerome E. J. Keane, treasurer, and Frederick A. Carey, secretary.

J. W. Murray will be chairman of the board. The company will be affiliated with the J. W. Murray Manufacturing Co., stampings manufacturer. Gordon Fairgreaves, who has been general manager of the Towson company for many years, will be general manager of the Murray Body Co.

Financial Interests Represented

Aside from the Murrays, the officers shown in the incorporation are mainly representative of financial interests. Mr. Fairgreaves is well known as a body builder. As general manager of the Towson company he has been responsible in a large measure for the continued success of this company, which specialized in high grade semi-custom closed bodies for the Packard and Lincoln companies.

Under the plans of operation of the new company, it is understood that the Towson company will continue as the high grade body builder of the combination, while the Wilson and Widman companies will continue the manufacture of medium priced and low priced bodies on a production basis. The normal capacity of the plants at the present time is approximately 20,000 closed and 10,000 open bodies monthly. Total floor space is 45 acres. There are about 7500 employees.

Trend Toward Concentration

In the formal statement on the merger it is declared that this action has been taken in view of the trend toward concentration of production of automobiles into a lesser number of producers. With large capital resources, coordinated production facilities and advantages due to greater purchasing power and reduced overhead expense, it is declared the new company will become one of the most potential supply units in the industry. Its position to serve the independent car companies, mergers among some of which are reported pending, is emphasized.

The relation of the J. W. Murray company to Murray Body, it is declared will be as an affiliated company. In connection with its relationship to the Body company, the J. W. Murray company has bought 36 acres on the Detroit River in River Rouge, on which it will build a new factory to employ 2900 men. A first unit of this plant, 40 x 460 ft., will be completed by Feb. 1.

Wilson Preferred Stock Called

DETROIT, Nov. 26—C. R. Wilson Body Co. has called its preferred stock for payment Jan. 1, 1925, at 110 and accrued dividends. The call applied to stockholders of record Nov. 26. The action follows the merger of the company with the Murray Body Corp.

Jersey Ends Coach Specification Hearing

TRENTON, N. J., Nov. 26—A final hearing on the proposed New Jersey motorcoach specifications, which have been under discussion for some time, was held before the Public Utility Commission here today. A. J. Scaife of the White Motor Co. acted as spokesman for the Society of Automotive Engineers Motorcoach Committee and argued in favor of the recommendations proposed recently by that committee.

Objections to various specifications proposed by the commission were made by representatives of Mack Trucks, Inc., though it is understood that engineers of the Mack company are in general agreement with the specifications proposed by the S. A. E.

No announcement concerning the decision of the commission has been made as yet, but since representatives of the commission have been cooperating with the S. A. E. Motorcoach Committee and are understood to be in general agreement with it on most important points, it is believed that the final decision is likely to be satisfactory in most respects to the committee and to the important bus manufacturers represented on it.

It is known, however, that members of the commission are inclined to favor a maximum body length of 21 ft. and an inside roof height of 76 in. minimum, as against a maximum body length of 24 ft. and inside height 74 in. recommended by the S. A. E. committee.

U. S. Taxes on Trucks Increased in October

WASHINGTON, Nov. 26—The Internal Revenue Bureau reports taxes collected on automobile trucks and automobile wagons in October of this year as $1,301,298, compared with $1,002,580 in October of last year.

Taxes paid on other automobiles and motorcycles aggregated $7,468,652 this October, as against $8,358,900 last year. Automobile parts and accessories paid taxes of $1,966,950 in October of this year, as against $3,613,556 in October of 1923.

E. S. Evans Regains Control of Company

Stewart-Warner-Bassick-Alemite Combine Releases Loading Organization

DETROIT, Nov. 26.—With the merging of the Stewart-Warner Speedometer Corp. and the Bassick-Alemite Corp., as recently effected, control of E. S. Evans & Co., automobile loading expert of this city, reverts to E. S. Evans, according to a statement by Mr. Evans, and the company is now owned by himself and Chicago interests.

Control of E. S. Evans & Co. was transferred from Mr. Evans to the Bassick-Alemite Corp. last winter. The latter organization bought 51 per cent of the stock, sold Mr. Evans a large block of Bassick-Alemite stock and made him vice-president and a member of the board, as well as continuing him and his organization at the head of the Evans company without any change in personnel.

With the merger of the Bassick and Stewart-Warner corporations, E. W. Bassick, together with Mr. Evans and J. G. Alexander, vice-presidents, will have sold out their interests in the Bassick company and will tender their resignations, according to Mr. Evans' statement.

As a result of the merger Mr. Evans again will devote practically his entire time to E. S. Evans & Co. The devices of this company are at present used in loading 90 per cent of the finished passenger cars and trucks shipped by railroads.

Improvements amounting to $350,000 are now being made to the Jackson, Miss., mills of the Evans company. The completion of these will insure larger capacity and greater efficiency in handling lumber and raw materials.

Stewart-Warner Financing

CHICAGO, Nov. 26—Stewart-Warner Speedometer Corp. has announced, in connection with its merger with the Bassick Alemite Co., that stockholders of the latter company will be given seven shares of Stewart-Warner stock for each 10 shares of Bassick Alemite held by them.

Stocks offered for exchange must be deposited before Dec. 10 with the Central Trust Co. of Illinois, 125 Monroe Street, this city. All fractional shares will be taken care of on a cash basis equal to $37.45 per whole share.

Bassick-Alemite Earns $5.69 a Share

CHICAGO, Nov. 25—Bassick-Alemite Corp., acquired by the Stewart-Warner Speedometer Corp., reports earnings for the nine months ended Sept. 30, 1924, of $1,139,220, or the equivalent of $5.69 a share on 200,000 shares outstanding, as compared with $1,401,465, or $7 a share in 1923.

Moline Plow Settles Suit for $280,000

Conclusion of Litigation with Peek and Associates Clears Way for Rehabilitation

MOLINE, ILL., Nov. 25—A settlement has been effected by the Moline Plow Co. with George N. Peek, former president, and Frank W. Edlin and Charles B. Rose, associated with him in the management of the company prior to its recent reorganization, by which the trio accept $280,000 in payment of their claims aggregating approximately $1,000,000 on contracts they held with the company.

The settlement of this suit, which has been pending in the Federal Court at Peoria a few weeks, will clear the path for continuance of the rehabilitation policy of the Moline Plow, its officers announced.

The Peek-Rose-Edlin claim arose from the cancellation of a 10-year contract to manage the company under stipulated salary with a profit-sharing agreement and division of receipts from disposal of any assets. Creditor-owners a few months ago took over the plant and instituted a new policy, the most drastic phase of which was the elimination of the non-profit making units and the concentration of activities at the Moline plant. The plaintiffs filed suit in the Federal Court for an accounting on their contracts and alleged that the sale of the outside units of the plant was being conducted without proper protection of their financial interests.

Company Claims Victory

The court declared that the contract is "valid and the claims of the plaintiffs have priority over all claims of any other creditors." The Moline Plow, however, claimed a victory in the case, inasmuch as it always has stood ready, its officers said, to make the settlement upon the figure which was finally accepted.

Evidence in the case showed the Moline Plow at this time has a balance of $4,780,000, with unliquidated assets of $2,500,000.

Hugh Johnson, the new president, says the company will continue with its plans to put the concern on a firmer footing and reenter the agricultural implement field with the revival of the farmer buying.

Ford Florida Assembling Plant Begins Operations

JACKSONVILLE, FLA., Nov. 26—With 350 men employed, the Ford Motor Co. assembling plant here started today to turn out cars and trucks in quantity. All of the employees, with the exception of a few department heads from Detroit, were recruited here.

The output is 50 vehicles a day, of which about 15 per cent consists of trucks. This will be speeded up until the designed capacity of 150 a day is reached. It is purely an assembling plant. All parts and accessories are shipped in from Detroit, mostly by Ford boats.

The new plant will supply all Florida and two counties of Georgia, a total of 170 dealers, with all Ford products, including Lincoln and Fordson tractors. The latter are shipped from Detroit completely assembled, ready for immediate use.

The plant consists of the main building, 200 by 500 ft., one story high, and has a concrete dock. A railroad siding enters the main building on one side and the assembling progresses across the width on moving platforms and conveyors.

Originally the plant was estimated to cost $85,000, but the concrete dock is said to have cost $250,000, while a high price was paid on the 10 acres of land. The whole investment will amount to about $500,000. The yearly payroll at capacity will amount to about $1,000,000.

Activities Increase in the Tire Industries

AKRON, OHIO, Nov. 25—Signs of further improvement in the tire and rubber industry, as was predicted after election, are becoming more manifest.

Although this is not generally considered the best period of the year for tire manufacturers, sales managers report that automobile makers and tire dealers are showing a tendency to break away from the "hand-to-mouth" policy which has characterized the trade for the past year.

Motor Body Merger Started in Canada

TORONTO, ONT., Nov. 26—A new carriage company is being incorporated under the name of Canada Carriage & Truck Co., Ltd., to take over the plant, property and business of Brantford Carriage Co., Ltd., Dominion Carriage Co., Ltd., and the Alexandria plant of Carriage Factories, Ltd., all of which have been manufacturing light motor truck bodies, which the new company will continue.

Carriage Factories, Ltd., retains its plant at Orillia, Ont., which will continue to carry on its business of manufacturing automobile bodies and heavy trucks.

The decrease in recent years in the demand from the country districts for buggies and other horse-drawn vehicles has made it difficult to keep any of the plants engaged in this business working at full time. This is the principal reason for the amalgamation.

FORD'S LONDON, ONT., PLANT

LONDON, ONT., Nov. 26—The Ford Motor Co. of Canada, Ltd., is re-opening its plant here and will devote its equipment to the manufacture of lamps and electrical equipment. W. R. Campbell, the vice-president, says alterations will be made to the interior.

Motor Wheel to Pay 2 Per Cent Extra

Decision Reached Following Payment of Indebtedness of Over $1,500,000

DETROIT, Nov. 26—Directors of Motor Wheel Corp. have declared an extra cash dividend of 2 per cent in addition to the regular quarterly dividend of 2 per cent on the common stock, payable Dec. 20 to stock of record Dec. 10. This is the first extra dividend the company has ever declared.

The disbursement was voted on recommendation of H. F. Harper, president, in view, as he stated, of the strong financial position of the corporation. He referred to the fact that since Dec. 31, 1923, the date of the last published financial statement, the corporation has paid off indebtedness of more than $1,500,000 and now has no bank indebtedness whatsoever.

"Our volume of business for 1924 has been very satisfactory," Mr. Harper said. "The automotive parts business must depend today upon economy of manufacturing and immense volume to produce profits for its stockholders. We are greatly pleased that in the face of decrease of general automobile production we have been able to reduce our overhead because of increased volume, thus making possible the excellent financial condition of Motor Wheel at the present time."

The 1000 shares of preferred stock that the corporation offered to buy, as outlined in its circular letter of Oct. 27, have been accumulated, it was declared, this leading to the decision to distribute some of the surplus earnings to the common stockholders.

Ford Canadian Sales 12,895 in Three Months

FORD, ONT., Nov. 26—Ford Motor Co. of Canada, Ltd., reports sales at retail in Canada and for export of 12,895 cars and trucks during the first quarter of its fiscal year, which includes August, September and October. Production amounted to 11,167 in the same period. This compares with retail sales of 16,706 and output of 15,443 in the corresponding period of last year.

Export shipments totaled 6162 units, or 48 per cent of the total sales, as compared with 9213, or 55 per cent, a year ago.

October sales, foreign and domestic, reached 4190 units, and production 3816, against 5273 and 4778 respectively in October of 1923.

TO OPEN ALFA-ROMEO AGENCY

NEW YORK, Nov. 26—Ronaldo Stroppa-Quaglia has sailed from Italy to open a branch in New York City for the sale of the Alfa-Romeo.

Highway Association to Discuss Traffic

National Body, Dec. 2, Will Hear Addresses on a Varied List of Subjects

NEW YORK, Nov. 26—Various questions of interest to the automotive industry will be discussed at the annual meeting of the National Highway Traffic Association, to be held at the Automobile Club of America, 12 East Fifty-third Street, this city, on Dec. 2. The meeting will be opened at 2.30 p. m. with a report of the National Committee on weights, dimensions and speeds of tractors, trailers and semi-trailers. The chairman of this committee is George H. Pride.

Following this report, G. C. Dillman, deputy commissioner-chief engineer of the Michigan State Highway Department, will give a talk on "Pedestrian Subways Under State Highways." An address on "Methods of Increasing Traffic Capacity of Streets" will be made by Arthur S. Tuthill, chief engineer of the board of estimate and apportionment of New York City.

Arthur H. Blanchard, professor of highway engineering and highway transport of the University of Michigan, will speak on "State Fees for Commercial Motor Vehicle, Private and Common Carriers." This will be followed by an address on "Enforcement of Traffic Regulations by the Utilization of a Police Traffic Bureau" by Prof. Lewis W. McIntyre of the civil engineering department of the University of Pittsburgh.

At the evening session at 8 p. m., Ernest P. Goodrich, vice-president of the Technical Advisory Corp. of New York City, will speak on "Methods of Forecasting Future Traffic and the Saturation Point in the Utilization of Motor Vehicles." Compulsory automobile liability insurance will be taken up by Russell Huffman, secretary of the Motor Vehicle Conference Committee of the National Automobile Chamber of Commerce. There will also be a discussion of the solution of the "Parking Problem in Congested Districts of Municipalities."

Hydraulic Develops New Internal Brake

DETROIT, Nov. 26—The Hydraulic Brake Co., owner of the patents covering Lockheed hydraulic brakes, has developed a new internal brake of the three-shoe servo type.

Use is made of the energy of the rotating drum with consequent reduction of pedal pressure. The degree of braking obtained is directly in proportion to the pressure applied to the pedal and at all times directly under the control of the operator.

The new brake is actuated hydraulically in substantially the same manner as the Lockheed external brake.

$11,000,000 *ASKED FOR AIR MAIL LINE*

WASHINGTON, Nov. 26—All appropriation for the next fiscal year of $11,000,000 is to be asked by the Post Office Department for the construction of an extensive air mail service, which will give the department between 500 and 1000 new flying ships, adequate landing fields and a string of illuminating beacons from New York to the Pacific Coast.

Details of the air mail program now being worked out for submission to Congress will call for more than four times the amount appropriated for the current year, $2,750,000. The record of the air mail service during its two and one-half years, the department believes, justifies the appropriation which will provide for the enlarged program.

Motor Truck Production Increases in October

WASHINGTON, Nov. 26—Output of passenger cars and motor trucks in October aggregated 289,333, compared with 290,976 in the preceding month. Production of motor trucks during October reached a total of 31,433, as against 30,805 in September. These figures are contained in the monthly report on motor vehicle production compiled by the Department of Commerce.

The following table is a recapitulation of the full year of 1923 and the ten months of the current year.

PASSENGER CARS	1923	1924
January	223,822	287,353
February	254,782	336,371
March	319,789	348,356
April	344,661	337,045
May	350,460	279,455
June	337,442	217,935
July	297,413	237,668
August	314,431	251,551
September	298,964	*260,171
October	335,041	257,900
November	284,939	.....
December	275,472	.....
TRUCKS		
January	*19,739	*28,929
February	*22,178	*31,161
March	*35,298	*34,138
April	*38,102	*36,169
May	*43,757	*33,421
June	*41,176	*27,894
July	*30,708	*25,251
August	*30,894	*27,523
September	*28,592	*30,805
October	*30,153	31,433
November	*28,085	.....
December	*27,772	.....

*Revised

TIRE DEALERS RE-ELECT

AKRON, Nov. 26—The National Tire Dealers Association closed a three days' session here by re-electing George J. Burger, New York, president; J. W. Waber of Chicago, vice-president, and P. J. Quigley of Memphis, Henry Alden of Minneapolis, Arthur Roderick of Akron, Clay Manville of Pittsburgh and Herbert Ruhnke of Milwaukee, directors.

Chevrolet Completes Body Plant Plan

Building of Unit Adjoining Factory at Tarrytown Carries Out Cost Reduction Program

DETROIT, Nov. 26—The completion of the body plant adjoining the Chevrolet assembly plant at Tarrytown by Jan. 1 will mark the fulfilment of a plan by the Chevrolet company to parallel each of its assembly plants with a body plant, thereby reducing freight costs on body shipments to a minimum. The assembly plants at which body factories are now being operated by Fisher Body Corp. are at Flint, St. Louis, Oakland, Cal., Janesville, Wis., Cincinnati and Buffalo.

The company notes that there has been a close connection between the establishment of assembly plants and the gradual reduction in prices in the last five years, particularly since the body plants have been connected with the car assembly units. These body plants are owned by the Chevrolet company, but operated by the Fisher corporation, as the body building organization of General Motors.

From early in 1920 to the present there have been reductions in the price of Chevrolet cars approximating 35 per cent.

Michigan Puts Brake on Stolen Car Sales

DETROIT, Nov. 26—Certificates of title for cars, required under the Michigan statutes for lawful possession, will be stamped this year indelibly with the number of the license issued and corresponding with the certificate. This will make it more difficult to dispose of a stolen car to a dealer or to the public. This change has been worked out by the Department of State through the active cooperation of the Michigan Automotive Trade Association and the Detroit Automobile Dealers Association.

In revising the requirements, it has been pointed out that car owners are careless of the number plates and that often they are not attached to the cars for which they were purchased. The law requires that both the license and the certificate of title be transferred in the event of a sale of the car during the year in which it was licensed. The title cannot be transferred unless the license is also transferred.

The stamp of the license number on the certificate gives the dealer and purchaser assurance that the car is properly owned.

STANDARD GETS BUS AWARD

DETROIT, Nov 26—Standard Motor Truck Co. has been awarded the contract for 50 double-deck buses, to be operated by the city of Detroit in conjunction with its street railway lines. The Standard bid was $9,500.

Essex Coach Reduced Below Open Model

New List Price Is $895—Hudson Company Also Cuts Five and Seven-Passenger Sedans

DETROIT, Nov. 26—The Hudson Motor Car Co. has reduced the price of the Hudson and Essex coaches $50, so that they now list at $1,345 and $895 respectively. The prices of both the five and seven-passenger Hudson sedans have been lowered to $1,795 and $1,895, a cut of $355.

With this reduction, the Essex Coach now lists for the first time at a figure below the cost of the open model, the phaeton costing $5 more. The seven-passenger open Hudson model is now $155 higher than the coach. No changes have been made on any of the open models, and the new prices are effective immediately. The following table shows the new schedule:

	Old Price	New Price
Essex		
5-passenger phaeton	$900	$900
5-passenger coach	945	895
Hudson		
4-passenger speedster	1,400	1,400
7-passenger phaeton	1,500	1,500
5-passenger coach	1,395	1,345
5-passenger sedan	2,150	1,795
7-passenger sedan	2,250	1,895

More Price Cuts Made in England and France

LONDON, Nov. 18 (*by mail*)—Since the closing of the Olympia Show two British makers (Talbot and Wolseley) and one French (Renault) have reduced prices a second time this fall. Wolseley reductions apply to the 11-hp. four-cylinder model and amount to £50 off the original prices of £275 and £285 of the two-seated and four-seated cars respectively.

In the case of the first this represents a cut of over 16 per cent. Talbot has taken £15 off the price of all models of the 10-23 hp. "Four" and £25 off the 12-30 hp. "Six," reductions of approximately 4 per cent in both cases.

Renault cuts average 6 per cent.

CADILLAC INCREASES PRICES

DETROIT, Nov. 26—Cadillac Motor Car Co. has increased the price of its three open models, four-passenger roadster, four-passenger phaeton and seven-passenger touring, from $3,085 to $3,185, the increase of $100 applying in each case.

PHILADELPHIA SALES LOWER

PHILADELPHIA, Nov. 26—A sharp decline in the sale of passenger cars during November has been experienced by dealers in this territory. The drop is felt most by those handling the lower priced cars. Fewer cars have been sold thus far in the month than were disposed of a year ago. Used cars remain only in small quantities.

Business in Brief

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

NEW YORK, Nov. 26—The abundance of loanable capital and the increasing confidence in economic revival abroad were newly emphasized on Monday of this week in the immediate oversubscription of the $100,000,000 loan to the French government. The buoyancy of the last two weeks in the stock market continues, together with a broadening tendency toward higher levels of production and trade. An important factor last week was the cooler weather, stimulating trade in seasonal lines.

Car loadings in the week ended Nov. 8, which included the election holiday, showed a seasonal decline, numbering 994,504, as compared with 1,073,430 in the preceding week, and 1,036,221 in the corresponding period a year ago.

Preliminary figures of foreign trade for October show exports of $527,000,000 and imports of $310,000,000, comparing with exports of $428,000,000 and imports of $287,000,000 in September and exports of $399,000,000 and imports of $308,000,000 in October, last year. The export balance, amounting to $217,000,000 compares with $91,000,000 a year ago. The export total is the largest since January, 1921.

The consumption of lint cotton by domestic mills in October amounted to 532,629 bales, comparing with 435,216 in the preceding month and 543,260 in October, 1923.

Production of crude petroleum in the week ended Nov. 15 increased for the first time since the middle of September, averaging 1,941,050 barrels a day, as against 1,935,550 in the preceding week and 2,224,300 a year ago.

Fisher's index of wholesale commodity prices stood at 154.8 last week, comparing with 153.8 in the preceding week and 150.9 two weeks before. Last week's figure is the highest recorded since the year's peak of 155.2 in the week ended Feb. 9. The indexes of the Bureau of Labor Statistics show increases for October in prices of farm products, foods, cloths and clothing, chemicals and drugs and miscellaneous commodities, with declines in fuel and lighting, metals and metal products and housefurnishing goods. Prices of building materials remain unchanged.

Bankers to Consider Time Sales Policy

Universal Plan to Be Chief Subject at Chicago Meeting, Scheduled for Dec. 10-11

CHICAGO, Nov. 27—An attendance of more than 300 is promised for a meeting of representatives of automobile finance companies, banks, bonding and insurance companies and automobile manufacturers, to be held in the LaSalle Hotel Dec. 10 and 11, for the purpose of discussing time sales of automobiles.

The committee in charge of the meeting consists of A. E. Duncan, chairman of the Commercial Credit Co., Baltimore; Henry Ittleson, president of the Commercial Investment Co., New York; John J. Schumann, Jr., vice-president of the General Motors Acceptance Corp., and John Little, secretary of the Chicago National Bond and Investment Co.

Plans call for a discussion of better credit investigation systems and a change in existing time payment methods, following the recommendations recently made at a meeting of financing interests in this city. These recommendations favor a universal policy of 33 1/3 per cent as an initial deposit on new passenger cars, instead of the 20 or 25 per cent allowed by some companies, and would reduce the period of payments from two years to a maximum of one year. They also favor having the payments made in equal monthly installments instead of a lump sum every three or four months.

Members of the committee state that they hope to make all automobile paper desirable to the banks and say that by reducing the time for payments and increasing the initial deposits fewer purchasers would default and the depreciation on defaulted cars would be lessened.

Employment Increase Continues in Toledo

TOLEDO, Nov. 26—Employment continues to improve in Toledo factories. So far in November there has been a net increase of 708 workers in 51 plants. Much of the gain is shown in the autotive plants.

The Willys-Overland plant is on the largest schedule. it has a larger payroll now than for many months. Inventory period was shortened to three days to enable the plant to get back to work on orders.

DRAKE ACQUIRES COMPANY

SAN FRANCISCO, Nov. 26—The entire holdings of the Drake Lock-Nut Co. of this city have been taken over by George F. Drake, founder of the company and for the last eight years its vice-president and manager. The company first started operations in this city and two years later organized the Drake Lock-Nut Co. of Ohio in Cleveland.

N. A. C. C. to Sponsor Transport Meeting

Coordination of All Forms of Transportation Object of Boston Gathering, Dec. 8-9

BOSTON, Nov. 26—To follow up the work done by the Transportation Conference of the Chamber of Commerce of the United States a year ago, when a committee headed by Alfred H. Swayne, vice-president of the General Motors Corp., presented a report that paved the way for the coordination of all forms of transportation into one system, a New England Motor Transport Conference will be held at the Copley Plaza Hotel, this city, on Dec. 8 and 9. It will be sponsored by the National Automobile Chamber of Commerce.

The conference will be opened by Mr. Swayne, who will explain its purpose and will speak for the automotive industry. The attitude of the railroads will be outlined by C. L. Bardo, general manager of the New York, New Haven & Hartford Railroad, that of the electric lines by Lucius S. Storrs, president of the Connecticut Co., and that of the independent users of trucks and buses by James M. Swift, counsel of the New England Motor Coach Association.

Following the addresses the conference will be split up into three discussion groups, one to devote its time to the motor bus problem, another to the motor truck and its relation to rail hauls, and the third will be a highway session at which New England's highway system will be discussed.

Regulation to Be Considered

Opportunity will be offered for full discussion of the competitive situation which exists between motor and rail carriers in New England. The question of regulation of motor carriers and their taxation will be thoroughly considered. Representatives will be present from railroads, street railways, shippers and motor carriers.

The program follows:

Monday, Dec. 8

10.30 a.m. "The Relation of Highway Transport to Other Transportation Facilities," Alfred H. Swayne.
"The Railroads and Highway Transport," C. L. Bardo.
"The Electric Railways and Highway Transport," Lucius S. Storrs.
"Independent Highway Transport," James M. Swift.
1.00 p.m. Luncheon.
2.00 p.m. TRUCK SESSION—T. R. Dahl, vice-president, White Motor Co., presiding, "Railroad-Truck Short Haul Competition."
MOTOR BUS SESSION—A. J. Brosseau, president, Mack Trucks, Inc., presiding. "The Field for Motor Bus Operation in New England."
HIGHWAY SESSION—Presiding officer to be announced. "Commercial Use of New England's Highways."

Tuesday, Dec. 9

10.30 a.m. TRUCK SESSION—
"Railroad Use of Trucks, What the Pennsylvania Has Done," Robert C. Wright, general traffic manager of the Pennsylvania Railroad.
"What the Boston & Maine Plans Are," speaker to be announced.
MOTOR BUS SESSION—
"Economics of Motor Bus Operation," Edward Dana, general manager, Boston Elevated Railroad.
Talk by W. J. Flickenger, Connecticut Co.
HIGHWAY SESSION—
"Relief for Street Congestion in Our Cities," J. Rowland Bibbins, consulting engineer, Washington.
2.30 p.m. Reports from Group Meetings and Resolutions Committee.
"Why Owners of Automobiles and Trucks and Buses Should Cooperate," Ernest N. Smith, general manager of the American Automobile Association.
"What the Government Is Doing in Research Work for Commercial Highway Transport," Speaker to be announced.

WOULD STANDARDIZE PUNCHINGS OF TAGS

WASHINGTON, Nov. 26—Standardization of punchings for automobile license plates, the lack of which at the present time prevents automobile manufacturers from adopting standard mountings, is to be taken up with automobile manufacturers, State highway officials and license tag manufacturers by the Division of Simplified Practice of the Department of Commerce.

The standardization movement has the backing of the Society of Automotive Engineers, which is working with the department on the matter.

Fast Automobile Speedway Planned for Laurel, Md.

WASHINGTON, Nov. 26—Plans for the construction of one of the fastest automobile speedways in the world at Laurel, Md., midway between this place and Baltimore, have been completed. Construction will begin on March 1, according to announced plans of a group of prominent automobile men of the two cities. The total outlay will be $500,000. The promoters expect to hold their first race on July 4.

The project is headed by William C. Thomas, Baltimore automobile man, who will be general manager of the speedway. The company, known as the Baltimore-Washington Speedway, Inc., with executive offices in the Hearst Tower Building at Baltimore, is incorporated for $1,000,000. Its incorporators are William E. Schloegel, Earle W. Blackburn and E. Seymour Parks.

The track will be 50 feet wide, with straightaways approximately 800 feet long, banked approximately 750 feet triple radius curves, built on a 45 deg. angle.

MOTOR RODEO DINNER DEC. 18

NEW YORK, Nov. 26—The annual Motor Rodeo dinner of the National Automobile Chamber of Commerce will be held at the Union League Club, this city, on Dec. 18.

Recommend Greater Capacity of Roads

Change in "De Luxe" Buses Suggested in Report to Be Sent to Safety Conference

WASHINGTON, Nov. 26—Recommendations that "de luxe" buses, with their wide spread of rear wheels, be barred from highways unless they can pass over every section of the highway without encroaching upon the lane of traffic in the opposite direction, is to be an outstanding recommendation of the Committee on Engineering and Construction of the National Conference on Street and Highway Safety, in its report which will be submitted when the conference meets here, Dec. 15, 16 and 17.

Foreseeing a vastly greater amount of motor traffic in the future, the committee, after several months of study, has prepared recommendations as to the most modern practices calculated to increase the capacity of the highways and at the same time to improve safety. Only a very small percentage of the street and highway accidents today can be attributed directly to construction and engineering defects, the committee found.

Four of the committee's recommendations deal with "cautionary or stop signs and signals at danger points, direction and distance signs at important intersections and signs and signals to indicate special traffic rules and regulations, which, it says, "should be provided as part of the construction and which should be simple and uniform for a given purpose throughout the United States."

Uniform Colors Suggested

Uniform color indications for signs and signals recommended by the committee are: Red for "stop"; green for "proceed"; yellow for "caution," as at curves; purple or other color as a special cautionary indication at crossroads; white letters or symbols on the red, green or purple backgrounds, and black letters or symbols on the yellow. Distance and direction signs should be black and white, the committee recommends.

Because parking or stopping on the traveled portion of rural highways is a common source of danger, the committee recommends that improved rural highways should be provided, either continuously or at intervals not exceeding 300 feet, with level parking places entirely outside of the traveled way. A clear view for 300 feet should be had on any public highway.

NASH WORKS NIGHT SHIFTS

MILWAUKEE, Nov. 26—Nash Motors Co. reports that night and day operations are the rule in all plants, including the main works at Kenosha, the branch in Milwaukee, and the Seaman Body Corp. factory in Milwaukee. The Seaman factory is running a Sunday shift in some departments.

Timber Conservation Urged by Coolidge

Automotive Industry, One of Largest Users, Well Represented at Conference

WASHINGTON, Nov. 26—Urging a specific program of timber conservation, President Coolidge this week addressed the National Conference on Utilization of Forest Products and sounded a warning that the nation faces timber exhaustion. He told the 400 delegates, representing every branch of the lumber growing, manufacturing and consuming industries, that one of the chief items in the problem is the present appalling waste.

The automobile industry, maintaining a position near the top of the list as one of the largest users of lumber, was represented by manufacturers and representatives of the National Automobile Chamber of Commerce. The automotive group was headed by Alfred Reeves, general manager, N. A. C. C., and included Alfred H. Swayne, vice-president, General Motors Corp.; W. O. Rutherford, vice-president, Goodrich Rubber Co.; A. J. Brosseau, president, Mack Trucks, Inc.; Roy D. Chapin, Hudson Motor Car Co.; Pyke Johnson of the N. A. C. C.; J. Walter Drake, assistant secretary of the Department of Commerce, and R. E. Brown of the Fisher Body Corp., also representative of the Society of Automotive Engineers.

Sizes Standardized

Mr. Drake, who spoke rather as a representative of the United States than as an automobile manufacturer, told the delegates of what the government was seeking to do to eliminate waste in various industries, and particularly what the Department of Commerce, with the aid of the industry itself, had accomplished in the standardization and simplification of lumber sizes and nomenclatures.

"For two years the Department of Commerce has worked on the simplification and standardization of lumber sizes," Mr. Drake said. "They have been definitely accepted by the industry with a resultant saving of approximately $200,000,000 annually. Speaking for our department, we deem it a privilege to be called upon by the Department of Agriculture to assist in the conservation campaign."

Automotive Industry's Part

Mr. Brown spoke on "Dimension Stock from the Standpoint of the Consumer." The automobile industry, he said, could standardize many things to assist in the conservation of timber. As an illustration, he cited a concrete case of his own company, which uses annually 200,000,000 ft. of lumber. He declared that they could save $1,500,000 annually in freight rates, if the shipping weight could be reduced. This reduction in weight could be secured, he pointed out, by having their stocks 33 1/3 to 50 per cent dressed, or completely machined.

"The matter of producing finished and machined parts at the source, however, is something which the manufacturing consumer must handle himself, as he could hardly afford to be dependent upon outside source, and especially is this true of the automobile industry, where appearance of the finished product is such a large factor," Mr. Brown said.

In discussing the part that the automobile industry can play in the conservation movement, Mr. Swayne declared that the industry stood ready to do anything within its power to aid in the elimination of lumber waste. "The reason we are here today is to indicate to this conference our willingness to do this, as signified by our presence."

Following the morning session the automobile men called at the White House and paid their respects. They had luncheon at the University Club and were the guests at a dinner tendered them by Mr. Drake that evening. In addition to those named as attending the conference, John N. Willys was a guest at the dinner.

Ford Adds to Capacity in South America

DETROIT, Nov. 26—Additions to the Ford Motor Co. plants at Sao Paulo and Buenos Aires will increase their production capacities by 180 per cent. Each will have a capacity in cars of 45,000 annually. These increases were made necessary by the rapidly growing South American trade, the company reports.

The Sao Paulo plant capacity will be increased 100 per cent by the gain in floor space, 74,550 to 94,463 ft.

The Buenos Aires addition will make an increase in capacity of approximately 80 per cent as a result of the increase in floor space from 82,500 to 153,500 ft. The immediate need for this, the company says, is indicated by the fact that sales of cars, trucks and tractors at this branch has increased 20 per cent over the last year's business.

The Sao Paulo business has increased 60 per cent.

Equipment Trade Better in Milwaukee District

MILWAUKEE, Nov. 26—Commenting on the general industrial situation in Milwaukee, the economist of the largest local bank singles out the automotive equipment manufacturing trade as one of the lines which reports a fair amount of incoming orders.

The foundry business is described as "somewhat spotty," some shops having all the orders they can handle, while others are not nearly so well provided. The average rate of operation is about 70 per cent.

The survey shows that the number employed in 50 typical industries in Milwaukee Nov. 1 was about 10 per cent above the off-peak point reached early in August.

Airplanes to Help Airships, Says Doerr

S. A. E. Metropolitan Section Hears Talks on Future of Air Navigation

NEW YORK, Nov. 26—At the meeting of the Metropolitan Section of the Society of Automotive Engineers at the Hotel Cumberland Lieutenant C. E. Rosendahl, navigating officer of the U.S.S. Shenandoah, talked on the management and operations of the navy's first lighter-than-air rigid airship.

Motion pictures were shown of the Shenandoah on the 7000-mile transcontinental trip and its contact at sea with the airship tender, the U.S.S. Patoka. The films illustrated the methods of attaching and releasing of the ship, as well as the taking on of fuel, helium and supplies, while anchored to the mooring masts at Lakehurst, N. J., Fort Worth, Tex., San Diego, Cal., and on the Patoka.

Following the lecture Dr. C. Doerr of the Goodyear Zeppelin Co. and one of the oldest Zeppelin pilots, related his experience in the handling of large rigid airships. Dr. Doerr said airplanes would supplement airship routes, rather than operate competitively.

On a commercial basis the effective range of an airplane is from 500 to 2000 miles, he said, whereas airships would prove most effective on distances from 2000 to 5000 miles, especially where the greater part of the route lay over the ocean. An ideal plan for an air route, he asserted, would be the carrying of passengers and mail across the continent by airplanes and then continuing the service to Europe or South America by dirigible.

G. H. Madelung of the Junkers Corp. of America and R. W. Hall, builder of metal airplane framework, spoke on the similarity of construction in the building of metal airplanes and the framework of rigid airships.

Numerous questions put to Lieutenant Rosendahl by members of the section brought the meeting to a close.

Iowa Motor Tax Law Ruled Unconstitutional

DES MOINES, IOWA, Nov. 26—Judge W. G. Bonner in the Polk County District Court has declared unconstitutional the Iowa motor vehicle law imposing a tax upon common carriers using the public highways. A verdict was returned in favor of the Manhattan Oil Co., charged with failure to pay the tax levied by the General Assembly.

The law exempts farm carriers from the tax and fixed a ton-mile rate for all other carriers. It was aimed at freight bus routes, but officers attempted to enforce it against delivery systems in rural communities and the oil companies maintaining tank wagon services.

California Issues New Headlight List

About 161 Devices, Approved Under a Former State Law, to Become Obsolete

SACRAMENTO, CAL., Nov. 26—Headlight devices that are legal under the laws of California after Dec. 31 are listed in a bulletin issued by Will H. Marsh, head of the State motor vehicle department, recently. The bulletin states that headlight conditions in the State are bad and that the division is anxious to see a big improvement before the rainy season starts.

Devices not included in Marsh's list will not be legal after Dec. 31. On that date some 161 devices, approved under a former State law, become obsolete. The officially approved list is as follows:

Lens; Dodge Brothers lens; Flintex lens, type J; Ford lens, type H.; Holophane No-Tilt lens No. 855; Hudson lens; Liberty lens, type D; Lincoln lens, type H; Macbeth lens, green visor type D; McKeelite lens; McKeelite lens, 6½ inch diameter (motorcycle size); Monogram lens; Monogram lens 6½ inch diameter (motorcycle size); Parab-o-Light lens, type F.W.; Patterson lens; Smith lens; Spreadlight lens 6½ inch diameter (motorcycle size); Spreadlight lens; Standard lens, Suess Rib Lens, type H; Viso lens.

Reflectors; Edmunds & Jones headlamp, type 20; Guide Ray headlamp, type A; Miro-Tilt headlamp, Brown reflector; Brown Universal reflector 7 in. diameter; Eclipse reflector; El Camino floodlite reflector; Flatlite reflector, Indiana 7 in. diameter; Flatlite Standard reflector; Paraflex reflector, type B.W.; Trippe reflector; Victor reflector 7¼ in. diameter.

Auxiliary Lights; Lorraine Controllable Driving Light; S & M Road-Lite No. 75; Safe-Lite; Se-Mor Roadlite.

Signals; Beam-O-Lite Traffic Signal (Using K-B "Invincible" Stop Signal); Bridgham Tail Light; Bussey Truck Signal; Diamond Signal, type B; Everyway Signal; Fuller Auto Signal; Hand of Safety Signal; Hysig Signal; Interstate Auto Signal; Kay Bee Left & Rite Signal including K-B Front Lights (used in connection with an approved Stop Signal); Kay Bee Wig Wag Signal, using Kay Bee Front Signal; P-A-T-S or Positive Auto Turning Signal; R.&H. Safety Signal; Red Arrow Signal.

Stop Signals; Little Beauty Stop Signal, type R; Kay Bee Beauty Stop Signal; Kay Bee Invincible Stop Signal; Kay Bee Ruby Ray Stop Signal; Dodge Bros. Stop Signal, type B.

Ford Motor Trademarks 2,651,000 Parts Daily

DETROIT, Nov. 26—Ford Motor Co. is now trademarking 2,651,000 parts daily. Different standard parts into which the trademark is worked during manufacture total 351, ranging from the 70 pound cylinder block to the quarter ounce switch key.

The company notes that a special department employing 18 skilled engravers is continually busy making the stamp dies, while scores of other workers throughout the plant are engaged in marking the parts. The daily average of stamps and stencils of the Ford trademark is 700.

BRUSSELS SHOW DEC. 6-17

BRUSSELS, Nov. 25—(*By Mail*)—This year's Brussels show will be held at the Palais du Cinquantenaire Dec. 6-17. So far 316 firms have secured spaces, including 75 exhibitors of passenger cars, 22 of motorcycles, 109 of accessories, 13 of tires, 32 of bodies, 17 of commercial vehicles, 28 of publications and 20 of miscellaneous products. Of the seventy-five firms which will exhibit passenger cars 11 are Belgian, 29 French, 24 American, eight Italian, two English and one Austrian.

Harvey Spring Output to Be Nearly Doubled

RACINE, WIS., Nov. 25—Nearly 100 per cent increase in its output of automobile springs will be effected by the Harvey Spring & Forging Co. by new construction now being undertaken and likely to be completed Jan. 1. The principal addition is the enlargement of the heat treating shop by a one-story structure, 100 x 144 ft.

The Harvey plant has been running full time steadily, and business has recently increased so that it has been necessary to organize a night crew.

The expansion of the business affects both the original equipment and the replacement spring business.

One of the principal customers is the Nash Motors Co. of Kenosha and Milwaukee, the requirements of which soon will be increased materially through the commencement of production by the new Ajax Motors Co., a Nash subsidiary, which will operate the old Mitchell factory in Racine.

Gasoline Price Advanced 1 Cent in New England

NEW YORK, Nov. 26—The Standard Oil Co. of New York has advanced the tank wagon price of gasoline 1 cent a gallon throughout the New England territory, bringing the price to 15 cents a gallon, which is in line with the price prevailing in New York. The Gulf Oil Co. has adjusted tank wagon prices to meet the Standard increase.

In connection with the increase figures compiled from the reports of 21 States charging a gasoline tax show a gain in consumption during the first nine months of the year amounting to 22.2 per cent, as compared with the corresponding period a year ago, and a gain of 20.6 per cent in September, as compared with September of last year.

Consumption for the nine months of this year amounted to 1,648,889,966 gallons, as against 1,349,526,412 a year ago.

In September of this year consumption aggregated 227,490,392 gallons, as against 188,569,481 last year.

DIRIGIBLE EXPERTS ARRIVE

NEW YORK, Nov. 25—Dr. Karl Arnstein, designer of the ZR-3 and managing director of the Zeppelin Works at Friedrichshaven, Germany, arrived here yesterday from Bremen to take charge of the new plant of the Goodyear-Zeppelin Co. at Akron. Accompanying him were 12 expert engineers.

Citroen Gets Large Presses in Toledo

American Machinery Being Shipped to French Maker Who Adopts U. S. Methods

TOLEDO, Nov. 26—What is claimed to be the largest double-crank press for the manufacture of metal products by cold pressing is being crated at the plant of the Toledo Machine & Tool Co. here for shipment to France for the new plant of André Citroen, manufacturer of automobiles, who is adopting American production methods in his European plants.

The press is one of a group of 44 being built at Toledo for this one manufacturer. Only a few more remain to be built.

This one press weighs 500,000 lb. and stands more than 25 ft. above the floor, with a base that extends more than 8 ft. below floor level. One giant gear in the center supplies the power which is distributed through two other large gears at either end. Each of these gears is more than 10 ft. in diameter.

The press is 140 in. wide. It will be used for pressing out side rails for automobile chassis and will be capable of pressing two at a time. It is counted on to produce 2000 rails daily.

A press of new design to secure compactness is being built in addition to the Citroen press for a Philadelphia concern.

Bell Machine Ships to Citroen

OSHKOSH, WIS., Nov. 26—The Bell Machine Co. of Oshkosh, Wis., which specializes in the manufacture of woodworking machinery designed for automobile body factories, has broken ground for a large shop addition to be used for new offices as well.

A large order has just been shipped to the Andre Citroen automobile works in France.

Fifty Spaces Reserved for Cordoba Show Dec. 6

BUENOS AIRES, ARGENTINA, Nov. 26—(*By Cable*)—Announcement has been made that the second annual Cordoba automobile show, under the direction of the Cordoba Automovil Club, will open on Dec. 6. About 50 firms have reserved space, representing cars, accessories, tires and other automotive products.

Cordoba is in the center of a rich agricultural area, the prosperity of which is assured by increasing prices for agricultural products. J. Eloy Vera, president of the club, anticipates that commercial results of the exhibition should be excellent.

The Buenos Aires motor firms, which handle distribution throughout the republic, are supporting the Cordoba exposition through local agents.

MEN OF THE INDUSTRY

Poxson Goes with Reo

Elikah G. Poxson has been made sales supervisor of the commercial vehicle department of Reo Motor Car Co. Mr. Poxson was recently sales manager of the Dort Motor Car Co., with which company he has served in sales capacities for a number of years. He also was connected temporarily with the Flint Motor Co.

Carberry Resigns from U. S. Rubber

John D. Carberry, assistant secretary and assistant treasurer of the United States Rubber Co., has resigned from that company after a continuous service of more than 32 years. Mr. Carberry became identified with the company in 1892 as secretary of the committee that appraised properties and assets of various companies entering into the formation of U. S. Rubber. In 1903 he was elected assistant secretary, later assistant treasurer, and became an active director and officer of many of the company's subsidiary and affiliated companies. For many years Mr. Carberry served both as secretary to the president and private secretary to Col. Samuel Colt.

Cooper Goes with Central Steel

A. B. Cooper has been appointed Philadelphia district sales manager of the Central Steel Co., with headquarters in the Widener building. Mr. Cooper has been identified with the steel industry for 17 years in both operating and sales work. He was formerly connected with the Tacony Steel Co. and the Penn Seaboard Steel Corp.

Brusch Walker Sales Manager

George A. Brusch, formerly sales manager for F. E. Maffett, Inc., Atlanta, and previously general sales manager for Ozburo, Abston Co. of Memphis, has been appointed general sales manager of the Walker Manufacturing Co., Racine, Wis., manufacturer of jacks.

Brenaman Represents Oakes

The Oakes Co. of Indianapolis, manufacturer of automobile parts and accessories, has appointed F. D. Brenaman as special sales representative. Mr. Brenaman was formerly identified with the Hassler Shock Absorber Co. as branch manager at St. Paul and retail sales manager at Milwaukee. Later he was connected with the Lincoln Shock Absorber Co. as factory detail man.

YELLOW TAXI LOWERS RATES

NEW YORK, Nov. 26—Material reduction in taxicab fares in this city will be put into effect Monday by the Yellow Taxicab Corp., according to announcement of President W. A. McGurk. Mr. McGurk stated that the rate would be substantially lower than that prevailing in London, which is equivalent to about 23 cents a mile.

The decision to lower the schedules, it was said, had been reached after a thorough investigation of taxicab rates in large European cities.

Austria Cuts Production of High Priced Cars

WASHINGTON, Nov. 25 — Manufacturers of high priced cars in Austria, such as the Daimler and Steyr, are cutting their production to a minimum, according to a cable to the United States Bureau of Foreign and Domestic Commerce.

The reduction in domestic buying power, together with increased foreign competition in the export market, has so materially affected the high priced manufacturers that "they may have to shut down entirely," according to the cable.

Low priced cars, however, are much in demand and domestic manufacturers are running behind orders.

French Decide to Admit Single Seaters for Race

PARIS, Nov. 18 (*by mail*)—Following the example set by America, single-seater bodies have been admitted for the French Grand Prix 122 cu. in. race, to be held on the new Monthhery track, near Paris, on July 26. This is the first occasion on which the driver only has been allowed aboard European racing cars.

The step has been taken after witnessing the success of American single seaters and on the request of race drivers, who were all of the opinion that no useful work remained for the mechanic, and that consequently it was foolish to risk a life needlessly.

As a compromise to the few opponents of single seaters, the French Club has decided on a minimum width of 31 in., this measurement being taken at the base of the seat. One mechanician can work on each car at the pits.

Schacht Motor Truck Co. Develops New Chassis

CINCINNATI, Nov. 26—A new coach chassis has been developed by the G. A. Schacht Motor Truck Co., to be in production by Jan. 1. It has a very low center of gravity, and Westinghouse air brakes operate on all four wheels. The engine is the Wisconsin six-cylinder Model Z, especially developed for bus service.

AUTOMOBILE CARS ORDERED

CHICAGO, Nov. 26—The Chicago & North Western Railroad has placed an order with the Pressed Steel Car Co. for 500 automobile cars and an order with the American Car & Foundry Co. for the same number.

Accident Insurance Motor Tax Planned

Law Proposed in Maryland to Raise Fund for Those Injured on Highways

ANNAPOLIS, MD., Nov. 26—A new departure in automobile insurance is to be tried in this State. The next Maryland legislature will be asked to pass a law taxing motorists to establish a fund from which persons injured in automobile accidents may receive compensation. The proposed law would be applicable only to personal injury and would not indemnify owners for damage to their cars. It is proposed that the fund be put in charge of a commission, which would hear claims of injured persons and fix damages.

The plan will be to impose each year a certain tax on such persons to whom a license is issued. This would create a fund which could be placed under the supervision of some person, body or commission to be named by the legislature. The State's workmen's compensation law has a certain scale to be paid to victims whose earning ability is impaired by some accident, and the law would follow this scale in making settlements.

It is believed that the plan can be worked out with small cost to each motorist, this being distributed evenly. It would be cheap insurance for the motorist, it is believed.

Hardwood Market Gains with Automotive Demand

CHICAGO, Nov. 26—A sharp increase in the volume of orders and inquiries from automobile interests is reported by hardwood manufacturers and hardwood wholesalers. This demand follows a period in which the automotive industry showed little interest in lumber supplies. Lumbermen are of the opinion that automobile establishments have pretty well cleaned up their stocks and that they will be a larger factor in hardwood buying from now on.

A few of the Wisconsin automobile and body plants have been steadily in the market for hardwoods for some time, it is reported, while most of the Michigan plants have been substantially out of the market, buying only in small lots for filling in purposes.

HIGHWAY RESEARCH MEETING

WASHINGTON, Nov. 26—A. J. Brosseau of Mack Trucks, Inc., will preside in the morning, and Pyke Johnson, of the National Automobile Chamber of Commerce, at the afternoon session on the second day of the fourth annual meeting of the Highway Research Board, Division of Engineering, National Research Council, to be held here Dec. 4 and 5.

California Fuel Tax Raises $14,000,000

Collections for Year Will Exceed Expectations by More Than $2,000,000

LOS ANGELES, Nov. 26—Indications are that the motor vehicle fuel tax of 2 cents per gallon collected in California this year will approximate $14,000,000 total. This exceeds expectations by more than $2,000,000. It is believed the amount raised in California from this source will be larger than in any other State. Already State officials have begun to devise ways and means for increasing the tax by legislation in 1925.

The proposals to make motorists "pay as they go" in this State are growing in their magnitude. At this time every motor vehicle pays a registration fee of $3 and it is proposed to increase it to $5. All commercial vehicles, except those used by public utilities and the State, counties, municipalities and the national government, pay a weight fee in addition.

All "for hire" commercial vehicles that do not operate exclusively within municipal corporate limits pay 4 per cent of their gross receipts. A strongly supported plan is to raise the weight fees, probably making them apply to all types of motor vehicles and increase the gross revenue percentage tax.

Advocates of these taxing measures are well organized and circulating their propaganda throughout the State. At this time there is no evidence of organized opposition.

Rainier Trucks Settles Old Company Affairs

NEW YORK, Nov. 26—Rainier Trucks, Inc., successor to the Rainier Motor Corp. is proceeding with the liquidation of the old company through the collection of accounts and bills receivable and through the purchase of inventory needed for the manufacturing of trucks. All remaining assets after the liquidation become the property of Rainier Trucks, Inc., without further payment.

Prior to 1920 Rainier Motor Corp. manufactured light trucks. Following the depression of that year the corporation undertook to expand its activities including the building of a complete line of truck models from one to six tons capacity, but the capital of the corporation was insufficient to carry on the business successfully. Through the appointment of a committee steps were then taken for liquidating the organization.

A new company was formed by J. T. Rainier, J. A. Rainier and Paul N. Lineberger, known as Rainier Trucks, Inc. This company took over the business of the old company, together with the plant property and equipment, subject to a 7-year mortgage of $135,000. It assumed none of the other assets or liabilities of the Rainier Motor Corp.

The capital for the new company was provided by the Rainier Securities Corp., managers of the underwriting syndicate of $250,000 of preferred stock. This stock is being offered to the public at par with a bonus of 2 shares of common with each share of preferred.

The stockholders in the old company received Class A stock and common stock in exchange for their holdings.

New officers and directors were elected to the board to facilitate the liquidation of the old company, but all operations are being conducted by Rainier Trucks, Inc.

The officers and directors of the new company are as follows: J. T. Rainier, president; J. A. Rainier, vice-president and treasurer; Paul N. Lineberger, vice-president and secretary; George W. Loft, E. T. Bedford, 2nd, and Albert McDonald, directors.

Ford Mind Still Open About Muscle Shoals

DETROIT, Nov. 26—That Henry Ford's mind is still open to reasonable proposals for the development of Muscle Shoals seems indicated by an exchange of letters between Mr. Ford's secretary and Allen J. Roulhac, mayor of Sheffield, Ala., in the heart of the shoals district. The letters were made public by E. G. Liebold, Ford's secretary.

"Despite Mr. Ford's criticism of Congress and his withdrawal of his offer for Muscle Shoals, if Congress has an offer to submit to us, it will be given prompt attention," Mr. Liebold wrote to Mayor Roulhac in reply to his note of regret that Mr. Ford had abandoned the idea of acquiring the property.

Pan-American Highway Congress Plan Drawn

WASHINGTON, Nov. 26—A tentative program for the first Pan-American Highway Congress, to be held in Buenos Aires the week of May 22, 1925, was adopted at the annual meeting of the board of governors of the Pan-American Union. Preceding the adoption of the program, Secretary of State Hughes was reelected chairman of the board for the ensuing year.

The tentative date of May 22, the board was informed, would be agreeable to the Government of Argentina. The board adopted a resolution indorsing the draft of program drawn up by the Pan-American Highway Commission.

BOSTON S. A. E. MEETING

BOSTON, Nov. 26—Thomas H. Dooling, manager of the Boston branch of the Electric Storage Battery Co., was the speaker at the November meeting of the New England section of the Society of Automotive Engineers. He spoke on "Storage Batteries." It was announced that the membership of the section had increased nearly 100 per cent.

Universal Spotlight Legislation Sought

Manufacturers Adopt Proposed Laws to Be Submitted to State Legislatures

LOS ANGELES, Nov. 26—Proposed universal spotlight legislation has been approved by the Spotlight Manufacturers Association, and efforts will be made by the organization toward its general adoption by State legislatures. The reading of the proposed legislation follows:

All spotlights used upon motor vehicles shall be so constructed and arranged that no portion of the main substantially parallel beam of light when measured 100 ft. or further ahead of said lights shall rise or be capable of being raised from the driver's seat to more than 42 in. above the level of the surface of the highway upon which the vehicle stands directly ahead of such motor vehicle, but when moved 30 degrees to the right, or to the left, parallel to the axis of the vehicle no limitation is placed upon the vertical movement—excepting spotlights on motorcycles.

Provided further, however, that in wet or rainy weather, or when the surface of the highway otherwise becomes wet, spotlights on motor vehicles:

Right Hand Application

Par. 1. Attached to the right-hand side of the motor vehicle must be so directed that no portion of the main substantially parallel beam of light strikes upon the roadway to the left of a line 3 ft. and parallel to the axis of the motor vehicle.

Left Hand Application

Par. 2. Attached to the left side of the motor vehicle must be so directed that no portion of the main substantially parallel beam of light strikes upon the roadway to the left of the axis of the motor vehicle.

Provided further, however, that none of the provisions of this section shall apply to Police or Fire Department vehicles, or ambulances.

Spotlights on Motorcycles

Must be so set and adjusted that no portion of the main substantially parallel beam of light shall rise to more than 42 in. above the level surface of the highway upon which the motorcycle stands directly ahead of such lights when measured 75 ft. or more, but will otherwise come under the provisions and limitations provided in paragraphs 1 and 2 of this section.

Provided further, however, that this section shall not apply to Police or Fire Department vehicles or ambulances.

FREMONT LISTS DEBTS

TOLEDO, Nov. 26—The Fremont Motor Corp., with outstanding debts of $48,453, which started bankruptcy proceedings several weeks ago, has filed in the federal court here a schedule listing its debts.

No indication is given of the company's assets.

Makers Interested in Show Trade Days

Many Indorse Them as Good Time to Meet Dealers Away from Crowds

NEW YORK, Nov. 26—Car manufacturers are showing increased interest in the trade days set aside for the national automobile shows. They see in these days an opportunity to meet their dealers and prospective dealers and inspect the parts and accessory exhibits, with the shows free of public crowds.

Among car makers who have indorsed the trade days and promised attendance of their sales, engineering and purchasing executives are: John N. Willys, president of the Willys-Overland Co.; George M. Graham, vice-president of the Chandler Motor Car Co., and Alvan Macauley, president of the Packard Motor Car Co.

Distributors and dealers, jobbers, service men and others in the industry also approve the trade days and are planning to attend. The National Automobile Chamber of Commerce, in accordance with its resolution recommending attendance of factory representatives, is actively at work to secure the attendance of the industry's executives during the trade days.

Accessory Makers Help

The Motor and Accessory Manufacturers Association, participating in the show for its members, is cooperating to bring about interesting exhibits and exhibit attendants competent to talk with men of the industry.

Other indorsements and promises of attendance have been received from L. E. Corcoran, general sales manager of the Pierce-Arrow Motor Car Co.; the Nordyke & Marmon Co.; H. C. Bradfield, general sales manager of the Yellow Cab Manufacturing Co.; Harry Jewett, president of the Paige-Detroit Motor Car Co.; C. D. Hastings, president of the Hupp Motor Car Corp., and A. B. C. Hardy, president of the Olds Motor Works.

Paige-Jewett will hold its dealer dinners Saturday evening, the second trade day, both at New York and Chicago, and Hupp has advanced its dealer meetings to Monday and Tuesday to tie up with the trade days.

Invitations and credentials for trade days attendance will be issued about Dec. 15 in New York. The trade days will be Friday and Saturday, Jan. 2 and 3, and at Chicago, Friday and Saturday, Jan. 23 and 24.

CHANGES AT JANESVILLE

JANESVILLE, WIS., Nov. 26—To facilitate important changes in the production methods, both the Chevrolet and the Fisher Body units at Janesville, Wis., are inoperative for about two weeks. They will resume about Dec. 1. The principal change is in the finishing department of the Fisher factory, which is converting to an exclusive use of the Duco process. Necessarily this affects changes in the line in the Chevrolet plant, for the chassis will no longer be painted as it moves forward. Considerable new machinery is being installed in both plants.

FINANCIAL NOTES

Hudson Motor Car Co. has declared the regular quarterly dividend of 75 cents, payable Jan. 2 to stock of record Dec. 15.

Willys Overland Co. reports earnings of $29,442 for the quarter ended Sept. 30, after interest, depreciation and other charges.

Pierce-Arrow Motor Car Co. shows net income in October after charges of $144,299, compared with $137,280 in the third quarter of the year, $138,144 in the second and $78,729 in the first.

Maxwell Motor Corp. has called for redemption, on Jan. 26, 1925, at the Central Union Trust Co., New York, at 105 and interest to March 1, 1925, the outstanding $4,750,000 7 per cent debenture bonds due in 1934. According to representatives of the company the retirement of these debentures reflects the strong financial position of the Maxwell organization. It was stated in some quarters that the company's class A stock is placed in line for dividends as a result of the elimination of the fixed charges on these bonds.

Hayes Wheel Co. for the nine months ended Sept. 30 reports net profit of $539,345 after interest, depreciation and Federal taxes, equivalent after allowing for preferred dividends to $2.64 a share on the outstanding 197,044 shares of no par common stock. This compares with $1,008,763, or $5.12 a share, in the corresponding period of last year. For the third quarter of this year net profit totaled $123,115, or 44 cents a share, on common after preferred dividends. In its balance sheet as of Sept. 30, the company reports accounts and notes receivable, less reserve, of $1,317,675 and accounts payable of $411,624.

Fisher Body Corp. reports net earnings for the third quarter of $3,876,881 after expenses and reserves for depreciation. This compares with $6,276,406 in the corresponding period of last year. After fixed charges and reserves for Federal taxes net income was reported at $3,178,199. After preferred dividends on Fisher Body Ohio Co. stock a balance remained equal to $5.02 a share earned on the 600,000 shares of no par value stock of the Fisher Body Corp. This compares with $2.55 a share earned in the second quarter and $8.45 a year ago. For the six months ended Oct. 31 the company reports net earnings of $6,098,624, after reserves for depreciation, against $12,082,516 last year. Net income of $4,874,369 was equal to $7.58 a share earned, compared with net income of $10,015,594, equal to $16.14 a share in the corresponding six months of last year.

Indiana Vehicle Users to Urge Legislation

INDIANAPOLIS, Nov. 26—The Indiana Highway & Motors Association, formerly the Allied Motors Commerce of Indiana, has announced that its third annual convention will be held here Dec. 4, when plans on legislative programs will be discussed.

The Legislature which meets next January is expected to pass some sort of regulatory acts regarding trucks and buses for hire. The association is leaning strongly toward regulation by the State highway commission, instead of by the public service commission. Papers will be presented by leaders in the State and by exponents of regulation by highway commissions as carried out in Kentucky.

Steady Export Gain Into Latin America

Commerce Department Reports More in 10 Months of 1924 Than in All of 1923

WASHINGTON, Nov. 26—Exports of cars and trucks into Latin American countries during the first nine months of this year established a record, which already has more than equaled the imports for the entire year of 1923, according to figures compiled by the automotive division of the United States Department of Commerce.

Altogether the exports from the United States the first nine months of this year went to 31 Latin American countries and totaled 7275 trucks, having a value of $4,548,987, and 35,643 passenger cars, having a value of $22,693,466. Compared with previous motor vehicle imports from the United States, the figures show the following:

	Passenger Cars		Motor Trucks	
	No.	Value	No.	Value
1913	2,710	$ 2,636,701	129	$ 213,279
1921	11,837	10,648,136	2,576	3,241,594
1922	16,594	12,375,187	2,308	1,602,833
1923	33,324	21,864,591	4,843	3,068,783
*1924	35,643	22,693,466	7,275	4,548,987

* Nine months.

Probably the best picture which the figures present, indicating the steady and rapid development of Latin America as an automotive market, is shown by a percentage comparison, computed by the government as follows:

Percentage Comparisons Showing Increases	Passenger cars	Trucks
1913	100%	100%
1921	437%	1,995%
1922	625%	1,789%
1923	1,229%	3,750%
1924 (9 mos.)	1,315%	5,640%

Individual markets, considered over the entire span of 10 years, show some notable increases. The figures show that Argentina, now the largest single buyer, ordered 8222 passenger cars in the first nine months of this year, as compared with 940 in 1913; 813 in 1921; 2497 in 1922, and 6645 in 1923. The nine months of this year produced shipments almost nine times as great as 1913 and more than one-fourth greater than all of 1923.

In trucks the proportion is greater, although the actual numbers are less; the nine months this year producing 434 shipments from the United States, as compared with 48 in 1913; 24 in 1921; 58 in 1922, and 199 in all of 1923.

Cuba is at present the second largest market in Latin America; Brazil third, and Uruguay fourth.

CORRECTION

Through a typographical error, AUTOMOTIVE INDUSTRIES of Nov. 6 stated that the inventory of crude rubber aggregated 49,645,000 long tons on hand on Sept. 30 and 50,760,000 long tons afloat. The figures should have been 49,465 and 50,760, respectively.

Tire Industry Shows Employment Increase

General Seasonal Decrease Is Reported in U. S. Survey of Country's Automobile Plants

WASHINGTON, Nov. 26—A general decrease in the number of employees working in the automobile industry is shown in the November industrial survey of the United States Employment Service. These decreases are about uniform throughout the industry, with the possible exception of one plant in Saginaw, Mich., which laid off 800 employees Nov. 1 and which made further reductions Nov. 15.

While the automobile industry is showing a decline in workers, due primarily to the usual seasonal slackening, the tire and rubber industry, in practically all cases, reports taking on an increasing number of workers and in some instances working night and day shifts.

Following is the report received by the Employment Service relating to the automobile and tire industry:

Detroit: There is a surplus of workers in all lines of industries, more so in the automobile factories, which are working only part time.

Flint: Factories are not taking on any new workers and there is a surplus of automobile factory help. Many automobile workers are being absorbed in road construction work.

Lansing: A surplus of automobile workers is reported, although all plants are running, except one factory.

Saginaw: All plants are running, except one plant, which released 800 men Nov. 1 and additional workers Nov. 15.

Racine, Wis.: There is a shortage of rubber factory workers. Practically all plants are working overtime.

Eau Claire, Wis.: A rubber company is employing day and night shifts and will continue to do so indefinitely.

Cincinnati: The automobile industry is operating about 75 per cent of capacity.

Dayton: There is a surplus of common labor. Tire plants running full time.

Akron: All the larger rubber factories and about 25 per cent of the smaller factories are working three shifts.

Buffalo: A large automobile building plant in Buffalo and another in Depew are temporarily closed, affecting 600 men. Two large plants in Kenmore and one in Buffalo show a further gain in operations and employment over the previous month.

Syracuse: Basic industries, notably automobile plants and steel mills, continue operating on part time, with reduced forces. The supply of laborers exceeds the demand.

Evansville, Ind.: A surplus of workers in all industries is evident. A large truck company is working overtime.

Kokomo: With the exception of a considerable surplus of automobile workers, employment conditions are about normal. All plants are running, except an automobile factory.

23 G. M. ACCEPTANCE OFFICES

DETROIT, Nov. 26—New branches of the General Motors Acceptance Corp. are to be opened, or are now operating, at the following cities: Charlotte, N. C., to handle business of all dealers in North and South Carolina; Memphis, Tenn., to handle business of all dealers in Tennessee, Arkansas, Louisiana and Mississippi; Omaha, Neb., to handle business of all dealers located in Nebraska and Iowa.

These additional branches bring the total offices in the United States to 23. There are also two offices in Canada and one in London, England.

INDUSTRIAL NOTES

Pressed Metal Co., manufacturer of light and medium stampings, has opened its new $500,000 plant in Pawtucket, R. I. The building, which is brick and steel construction, is one story with 29,000 sq. ft. of floor space. The company specializes in replacement products, automobile fenders and other pressed metal parts for the automotive, machine and hardware trade. Darius Goff is the president and treasurer. The other officers are: F. J. Powers, secretary; R. W. Reid, formerly connected with the Taft-Peirce Co., general manager, and S. X. Newman, sales manager.

Champion Spark Plug Co. has broken ground for the construction of a steel plant adjacent to its present main manufacturing buildings in Toledo. It will be a one-story building with a capacity of 60 tons of cold drawn steel a day and a 3,000-ton storage capacity. Plans call for the completion of the plant before March 1.

Pines Winterfront Co. has occupied the new addition to its building at 404-424 North Sacramento Blvd., Chicago. This addition practically doubles the floor space of the factory and greatly increases the capacity for the manufacture of Winterfronts.

Hinson Manufacturing Plant, Waterloo, Iowa, maker of textile automotive products, has started an addition to its factory, to be finished Jan. 1, providing 5400 sq. ft. of additional space to care for the growing business.

Jefferson Electric Manufacturing Co., Chicago, is moving into larger quarters at 501-511 South Green Street, that city, to take care of increased demand.

Ford Motorship Ties Up with a Record Cargo

DETROIT, Nov. 25—After making her last trip of the season, the motorship Henry Ford II of the Ford Motor Co. fleet, laden with more than 5,000,000 ft. of high grade lumber, the largest single shipment ever carried on the Great Lakes, has tied up for the winter at the River Rouge plant. The lumber will be unloaded as required.

The cargo, taken on at the Ford docks at L'Anse, in Upper Michigan, is a product of the Ford mills there. In addition to the lumber, the freighter carried a deck load 10 ft. high.

The Benson Ford, a sister ship, is scheduled to make her final trip with a like cargo the last of this month.

DETROIT EMPLOYMENT 195,103

DETROIT, Nov. 26—After touching a low point for the year during the preceding week, industrial employment in this city last week increased by 1078. This is the first weekly gain of any consequence since August and brings the total to 195,103, as compared with 212,397 a year ago.

METAL MARKETS

Whenever the steel market turns moderately active following a long spell of drowsiness, as is the case now, the relatively slower pace in the demand for automotive steels as compared with ordinary carbon steels for railroads, structural and general purposes comes in for comment.

It is generally conceded that there has been considerable improvement in steel buying by motor car and truck builders, but, so runs the conventional comment, the extent of this improvement is not comparable with the spectacular increase in orders placed by steel consumers in other branches of industry. Of course, not! These other steel-consuming industries were out of the market completely for months. Their return naturally attracts greater attention than the increase in orders placed by automotive consumers who have never turned their backs upon the market, placing orders consistently throughout the period when other consumers refrained from making purchases.

The market has definitely hardened on the basis of 2.40c. for hot-rolled and 4.15c. for cold-rolled strip steel, with cold-finished screw stock held at 2.70c., Pittsburgh mills. Early this week there were still rollers willing to book business for full-finished automobile sheets at 4.60c., although the expectation was that 4.75c. would become the general quotation before the month had ended.

Sales managers spoke of early advances in very confident tones, but appeared willing to book orders at present prices without any limitation, although one or two mills are said to have expressed unwillingness to commit themselves at prevailing prices for first quarter 1925 deliveries.

A 10 per cent advance in prices of bolts and nuts is generally anticipated. Non-integrated sheet rollers are anxiously awaiting developments in the sheet bar market. Makers of this semi-finished material may anticipate further improvement of the sheet market by advancing their first quarter 1925 price. For the present the quotation is $37 at $37.50.

Next week should shed considerable light on the extent of the demand that overhangs the market. Immediate shipment business, of course, is likely to taper off after the first week in December because of the approach of inventory time, but there should be a fair coverage of second-half January and February needs during the next fortnight, in the opinion of sales managers.

Pig Iron.—Following record-breaking sales in all of the markets, very little 1924 iron is available. Automotive foundries appear to have taken on considerable quantities of foundry and malleable. Prices are still on the uptrend. It is nothing unusual for one furnace to ask 50c. at $1 a ton above competitors' prices, in the firm belief that developments will fully justify this attitude.

Aluminum.—Outwardly routine conditions seems to prevail, but as the market's immediate future is absolutely within the control of the domestic producer, a change in prices might take place without forewarnings of any sort. German aluminum consumers have formed a new organization to combat too high prices on rolled metal.

Copper.—Last week's fractional recession put no damper on the optimism of producers with reference to the 1925 outlook. The prospects are for a rather quiet market over the year's remainder.

Car Dealer Indicted on Mail Fraud Charge

LEAVENWORTH, KAN., Nov. 26—A Federal grand jury sitting here has returned 11 indictments against Frank E. Mouse, former Studebaker motor car dealer of Emporia, Kan., charging him with the sale and transmission through the mails, to the Industrial Finance Corp. of South Bend, Ind., of notes from supposed retail customers, alleged to have been secured by cars which either did not exist or were not in the permanent possession of the supposed purchasers.

Each of the 11 indictments involves his wife.

Calendar

SHOWS

Dec. 1-14—Montevideo, Uruguay, Second Annual Uruguayan Automobile Show.

Dec. 1-13—Montevideo, Uruguay—Second Annual Motor Show, under the auspices of the Centro Automovilista del Uruguay, held in buildings of the Asociacion Rural del Uruguay.

Dec. 5-14—Berlin Automobile Show.

Dec. 5-21—Paris, France, Ninth Annual Exhibition for Aeronautics, Grand Palais of the Champs-Elysees.

Dec. 6—Cordoba, Argentina, Second Annual Automobile Show, under the direction of the Cordoba Automovil Club.

Dec. 6-17—Brussels, Belgium, Annual Automobile Show, called "salon de Bruxelles," Palais du Cinquantenaire.

Jan. 2-10—New York, National Automobile Show, under the auspices of the National Automobile Chamber of Commerce, Bronx Armory. Open to the public except on Jan. 2 and 3 which are trade days.

Jan. 17-24—Cleveland, Annual Automobile Show.

Jan. 23-31—Chicago, National Automobile Show, under the auspices of the National Automobile Chamber of Commerce, Coliseum and First Regiment Armory. Open to the public except on Jan. 23 and 24 which are trade days.

Jan. 25-31—Chicago Annual Automobile Salon.

Feb. 7-14—Kansas City, Mo., Annual Automobile Show.

Feb. 21-28—San Francisco, Pacific Annual Automobile Show.

March 7-14—Boston, Twenty-third Annual Automobile Show.

March 20-29—Geneva, Switzerland, Second Swiss International Motor Exhibition.

April 1-17—Sydney, Australia, Royal Agricultural Show. Embraces automobile exhibits.

April 22-May 7—Melbourne, Australia, International Automobile Show, under the auspices of the Chamber of Automotive Industries, in conjunction with the Royal Automobile Club of Victoria.

June—Rio de Janeiro, Brazil, Rio Automobile Show, originally scheduled for October, 1924, but postponed for more extensive arrangements.

CONVENTIONS

Dec. 2—Annual Meeting National Highway Traffic Association, New York City.

Dec. 4-5—Fourth Annual Meeting, Highway Research Board, Division of Engineering, National Research Council, Washington, D. C.

Dec. 8-9—Boston, New England Motor Transport Conference, Copley Plaza Hotel.

Dec. 9-11—Fifth Annual meeting, American Petroleum Institute, Texas Hotel, Fort Worth, Tex.

Jan. 5—New York, Convention under the auspices of the National Automobile Dealers Association, Hotel Commodore.

Jan. 5-9—Chicago, Road Show and Convention of the American Road Builders Association.

Jan. 26-29—Chicago, Eighth Annual Convention of the National Automobile Dealers Association, Hotel LaSalle.

June 22-27—Summer convention of the Automotive Equipment Association at the Broadmoor Hotel, Colorado Springs, Colo.

S. A. E. MEETINGS

Dec. 11—Indiana Section, Aviation Development, Major E. L. Hoffman; Superchargers, Dr. F. A. Moss.

Dec. 15—Cleveland Section, Development of Clutches, Ernest C. Wemp, Long Manufacturing Co., Old Colony Club, Hotel Cleveland.

Jan. 15—Indiana Section. Lubrication and Crank Case Dilution, W. S. Sparrow of the U. S. Bureau of Standards.

Jan. 19—Cleveland Section, Preparation of Fuel Charges and Detonation. Arthur H. Denison, Weger Motor Co., Old Colony Club, Hotel Cleveland.

Jan. 20-23—S. A. E. Annual Meeting, Detroit.

Feb.—Indiana Section, Automobile Finishes.

Feb. 16—Cleveland Section, Electrical Instruments and Measuring of Chassis Tests by Means of Them, J. H. Hunt, General Motors Research Corp., Old Colony Club, Cleveland.

Mar.—Indiana Section Developments in Transmission.

Mar. 16—Cleveland Section, Road and Riding Ability, Harry Horning, Waukesha Motor Co., Old Colony Club. Hotel Cleveland.

Apr. 9—Indiana Section, Talk by F. E. Hunt, vice-president of the General Motors Research Corp.

English Car Maker Enters Truck Field

LONDON, Nov. 17 (*by mail*)—Makers of the Bean passenger cars announce their entry into the truck side of the industry with a chassis intended for 25 cwt. (approximately 1½ short ton) loads. This will compete with the Morris one-tonner (of which the chassis price is £185), though it is sold at a higher figure, viz., £265. Like the Morris, it has the passenger car unit engine and four-speed gearset of the so-called 14 hp. model (four cylinders 151 cu. in.) which develops 32 b.hp. at its normal speed, approximately 2000 r.p.m.

Apart from the power-plant, the chassis is specially designed for truck work, but the layout is orthodox, with a spiral bevel final drive, of which the ratio is 6.14 to 1.

All brakes are located within the rear wheel drums. Thornycrofts have introduced a four-wheel drive tractor primarily for military purposes, but equally suitable for industrial work. It has a 4¾ x 6½-in. four-cylinder engine, six forward and two reverse speeds, four-wheel braking through the transmission, and is intended for use with pneumatic tires. The six speeds are divided into two series, each of which is for use according to the nature of the going. The gearset has three main shafts, of which the intermediate and driven ones are coupled by what can be viewed as optional constant mesh gears.

Two gearshift levers are provided, one for changing the ratios as usual, irrespective of the constant mesh gears in use for the time being, the other for shifting the constant mesh gears to bring one or other of the two series of three ratios into service.

This arrangement affords on the high series ratios varying between 8.25 and 20.6 to 1, and on the low series a range from 15.25 to 38.2 to 1. The reverse ratios are respectively 27.5 and 50.7 to 1.

Mirroscope Firm Acquires Port Chester Company

PORT CHESTER, N. Y., Nov. 25—The Mirroscope Co. of America, Inc., a new corporation, has purchased the material assets of the Alexander Mirroscope Co., Inc., of this place, and will continue the business on a larger scale, according to an announcement just made.

James Firestone Barnet of Akron, Ohio, who for the last 12 years has been associated with Harvey S. Firestone of the Firestone Tire & Rubber Co., recently as managing director of the company and of subsidiary interests in the Far East, has been elected vice-president and treasurer of the new company.

GRAHAM TO ADDRESS S. A. E.

WASHINGTON, Nov. 25—George M. Graham, chairman of the Public Relations Committee of Secretary Hoover's Conference on the Regulation of Traffic and vice-president of the Chandler Motor Co., will be the speaker at the next meeting of the Washington section of the Society of Automotive Engineers, to be held at the Cosmos Club on Dec. 14. He will speak on the work of the conference, which begins Dec. 15.

Michigan Car Sales 15,243 in October

DETROIT, Nov. 26—October passenger car sales in Michigan totaled 15,243, an increase over the 12,345 total in September and the 13,830 in October, 1923. The noteworthy feature of the report, as assembled by the Michigan Automotive Trade Association from official State registrations is that the gain has been made entirely in the rural and smaller industrial counties of the State. Detroit showed a loss of 906 under the 1923 figure and of about 350 under the September total.

A further feature of the month's trading of interest to the industry generally is the report of 21,606 transfers of titles in the State, these being entirely used car sales. This is a large increase over the September figures and shows a decided upward trend in the used car market. Not all the transfers were on cars sold by dealers, but all were on sales of used cars either by dealers or owners.

Truck sales in October totaled 1940, an increase over the 1161 figure in September and over the 1634 figure in October, 1923. This increase was general throughout the State, farming districts and industrial sections showing higher figures over last month and last year.

Ford sales in October were 7320, or 48 per cent of the total, which compares with 50 per cent last year. Low priced cars, including Fords, totaled 63 per cent of sales, comparing with 70 per cent last year. Cars $1,000 and under totaled 76 per cent, as compared to 80 per cent in 1923.